

DEVELOPMENT OF RESOURCES AND
STABILIZATION OF EMPLOYMENT IN THE
UNITED STATES



JANUARY 1941

NATIONAL RESOURCES PLANNING BOARD

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MESSAGE FROM THE PRESIDENT

To the Congress of the United States:

National defense is more than a mobilization of a Nation's armed strength. Equally must we focus public thought on the ideals and objectives of our national life. We must seek wider understanding of the possibilities for that future we prepare to defend.

Among those possibilities are the larger use, the conservation and development of the Nation's resources. I have from time to time during the past 8 years called to the attention of the Congress these possibilities; and during these years several laws have been enacted to promote the orderly development and prudent husbandry of our national resources, human as well as material.

The National Resources Planning Board has now completed its report, which I send you herewith, on the Development of Resources and the Stabilization of Employment in the United States. This is the first of a series of such reports which each year I shall transmit to the Congress shortly after submission of the Budget of the United States.

The Budget contains the recommendations of the Chief Executive for the financial outlays to carry on a public works program during the next fiscal year. This report places these recommendations within the framework of a long-range policy of intelligent planning for the future. It contains a 6-year program of public construction and a statement of related future policies and plans of the Federal Government.

Under the terms of Reorganization Plan No. 1, effective July 1, 1939, I have, by a series of Executive orders, given to the National Resources Planning Board responsibility for correlating the 6-year public works programs of those agencies which plan or undertake construction directly for the Federal Government and those which indirectly participate in construction by means of loans, grants, or other financial aid. The Board is also aiding cities and States to prepare similar programs or capital budgets so as to develop a full and coordinated program of national development.

The Board can thus help to iron out conflicts among the plans of different agencies, and to present for consideration by the Congress a program which expresses local, State, regional, and national aspirations for a progressive development of our resources and for stabilization of employment.

This 6-year program lists the Budget estimates for the coming fiscal year and summarizes a developing program for the ensuing 5 years. If projects are to be ready at hand for rapid inauguration in times of need, the surveys and investigations, the engineering plans and specifications must be prepared in advance. Authorizations and financial arrangements must be already agreed upon.

The planning revolving fund, suggested in the Board's report, would make available a shelf of useful projects without in any way committing the Government to the immediate construction of such works. Because of the current national emergency, projects not needed for defense have been temporarily deferred. As a result, we are now in the process of storing up a reservoir of nondefense public work which can be loosed when the pace of rearmament slackens.

The report of the Board is divided into three parts:

Part I. The Federal program for national development.—This is the report of the Board and contains its findings and recommendations.

Part II. Regional development plans.—This section reproduces statements prepared through the 10 regional offices of the Board in cooperation with regional and State planning agencies and with representative citizens.

Part III. Functional development policies.—This part of the report is devoted to studies by the technical advisory committees of the Board on national policies for the development of our land, water, and energy resources.

To facilitate their use by the Congress, I recommend that all three parts of the report be printed, together with the illustrations and supporting tables.

FRANKLIN D. ROOSEVELT.

THE WHITE HOUSE,
March 17, 1941.

PART I. THE FEDERAL PROGRAM FOR NATIONAL DEVELOPMENT

LETTER OF TRANSMITTAL

EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL RESOURCES PLANNING BOARD
WASHINGTON, D. C.

December 31, 1940.

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT: We have the honor to transmit herewith a report of the National Resources Planning Board on Development of Resources and Stabilization of Employment in the United States.

In accordance with your instructions and the requirements of the Federal Employment Stabilization Act of 1931, the report reviews "the trend of employment and business activity * * * in the United States," discusses the possibilities of and limitations on the use of public works, both for national development and to combat unemployment, and presents a recommended 6-year program of Federal public works. Supporting this statement by the Board we are also presenting two other parts of the report, so that the whole document consists of:

Part I—The Federal Program for National Development.

Part II—Regional Development Plans.

Part III—Functional Development Policies.

The 6-year program provides a reservoir of long-range projects originated by Federal construction agencies from which the Congress and the administration can select activities in amounts and kinds appropriate to the times and the needs of the Nation. It suggests alternative lines of policy for land, water, energy, and transportation and of regional development as a basis for improved plans and programs in future years. The 6-year program is a concrete and practical application of planning which will change from year to year with the development of our national resources.

Respectfully submitted.

FREDERIC A. DELANO, *Chairman.*
CHARLES E. MERRIAM.
GEORGE F. YANTIS.

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DEVELOPMENT OF RESOURCES AND STABILIZATION OF EMPLOY- MENT IN THE UNITED STATES

PART I: THE FEDERAL PROGRAM FOR NATIONAL DEVELOPMENT

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RECOMMENDATIONS

In order to provide a "shelf" or "reservoir" of public construction projects of tested value, the Board recommends:

1. Continued and invigorated efforts to secure the preparation of *six-year programs or capital budgets* by Federal agencies, State governments, local governments, and other agencies, public and private, anticipating a large volume of construction activity.

2. *Development of alternative lists of projects* included in six-year programs according to size of the project, types and locations of skilled and unskilled labor involved, materials needed, rapidity of beginning, and flexibility of termination—all in relation to employment stabilization.

3. *Immediate inauguration of surveys*, investigations, and preparation of engineering plans and specifications for selected projects through allocation of aids to Federal and non-Federal agencies from a revolving fund to be administered by the President through his Executive Office; and reimbursed to the revolving fund as part of the cost of construction of the project.

To permit rapid inauguration of work on projects in times of need:

4. *Advance authorization by the Congress* of procedures for grants, loans, guaranties of loans, leasing arrangements, or other devices for aids to State and local governments for non-Federal projects for employment stabilization effective upon appropriation of funds by the Congress.

5. *Advance authorization by the Congress* of construction of Federal projects in six-year program of "A" priorities. Such authorization should be effective upon appropriation of funds by the Congress, and not in itself involve any commitment for the immediate construction of the project.

6. *Appropriation for advance purchase of sites* of projects by appropriate governmental agencies.

7. *Development of method of financing public works* projects and studies of related problems of investment, taxation, and the Federal, State, and local shares of responsibility for costs of various types of public works and related activities.

8. *Coordination of public works* construction at all levels of government, with other public policies which affect the level of business activity and employment, such as fiscal policy, social security policy, and policies of aid to private enterprise.

A. INTRODUCTION—OBJECTIVES AND ECONOMIC CONSIDERATIONS

The basic objective of a public works program is to provide public facilities required for the maintenance and progressive development of the standard of living of the American people.

No economic system is an end in itself; rather, it is merely a means employed to satisfy human wants. These wants must be translated into terms of facilities, goods, and services needed for the standard of life to which we aspire. The relative spheres of public and private activity in the provision of these facilities, goods, and services are not sharply defined. We recognize that our economic system is one of joint private and public activity, and with proper historical perspective, we can see that this economic system has always been a joint one. The distinction between our current economic organization and that of a century or more ago is not one of kind, but rather one of degree. Public functions have of necessity increased, but public functions supporting and supplementary to private activity have their roots in the traditions, laws, and practices of organized society. We rely mainly on a system of private enterprise to provide needed facilities, goods, and services, but with the growing complexity of an urban and industrial society, we have had to turn more and more to government as an adjusting factor. This we have done as experience has demonstrated the need of public action supplementary to the functioning of our private enterprise system. When we have become convinced that the organization of a segment of the economy was such as not to yield the desired facilities, goods, and services, we have not hesitated long in the adoption of appropriate governmental measures, such as tariffs, subsidies, and monopoly controls.

We have always recognized that the provision of certain basic facilities is an appropriate public function. The important point, however, is that, with the increasing complexity of our society and with our increasing dependence on continuity of economic activity, we have correspondingly extended the scope of these public activities. In doing so, we have had two social objectives in mind:

In the first place, there has been a growing realization of the importance of planning for the conservation and fuller utilization of our resources. For example, we have, rather belatedly, come to recognize the profligacy in the dissipation of many of our irreplaceable natural resources, such as our soils and our petroleum; the folly of our failure to protect our replaceable natural resources, such as our forests; the social distortion in our neglect of

the natural beauty of our landscapes; and the lack of vision in our failure to secure harmonious functional planning of our cities.

In the second place, there has developed growing recognition of the concern of government for the welfare of its citizens under changing conditions. An increasingly large proportion of our population has become completely dependent on the continuity of a pay roll relationship. When large segments of our population in times of economic stress have been separated from their customary private pay rolls, then government has had to fill the breach through relief payments, through unemployment benefits or social insurance, through work-relief pay rolls, or through direct employment. Only in this way could all members of our society have minimum access to the store of consumption goods.

Under this growing public responsibility, a new concept of public works planning has developed, namely, one that combines the objective of providing desirable public facilities with the new objective or social compulsion of providing useful work for those who can find no other outlet for their productive energies and skills and who lack means of access to essential consumption goods, as well as with the objective of seeking through such work to stabilize employment and economic activity. As a Nation, we are, therefore, confronted today with the problem of planning for the conservation and better utilization of our resources, planning for the provision of needed public facilities, and planning also for the productive employment of our resources in human skills and energies, including the related aim of employment stabilization.

Inspection of the national estate reveals the enormous need for a wide variety of useful public works—works that will increase the productive efficiency of the national estate and works that will yield dividends in national enjoyment. In planning a long-range program of public works, we may profitably view the problem as that of an intelligent manager of an estate who wishes to plan over the years for the doing of those things that are necessary to put his estate in good order for efficient production and for constructive enjoyment. We have a vast national estate, and intelligent husbandry requires that it be kept in good order. We cannot do in any one year all the desirable things that ought to be done, but with our intelligence and our skills, we can program over the years the things that we know now ought to be done

With our natural resources, our technical equipment, and our skills, we have the material basis for making the things that are desirable in providing any reasonable standard of living to which the American people may aspire. Ours, fortunately, is an expanding and developing economy, and we have at our command a sufficient quantity and variety of resources, a well developed industrial technique, and an intelligent, energetic, and skilled population. These are the primary essentials for providing those public works and those goods and services which we may desire. Essential too, of course, is an effective economic organization, since in a complex society economic organization must perforce act as a bridge between man as producer and man as consumer. Without effective economic organization, then, the primary essentials of resources, techniques, skills, and energies are merely potential avenues to welfare, as we have seen all too clearly in the decade of the 1930's.

It scarcely needs to be said that the richness of our domain does not free us from the responsibility of devoting our time and our energies to making right things, lest we waste our substance in making wrong things. Thus, we have the resources for using all our unemployed workers in the construction of pyramids, but we would scarcely call the decision to do so one of social intelligence.

The barrier that stands between us and the attainment of what we have looked on as the American standard of living is in part a psychological barrier. It is the notion that only through a vast national abstinence can we provide needed capital improvements or public works; that if we wish to provide these things we shall have to "tighten our belts," i. e., reduce our standard of living. We have too long burdened our thinking with these false analogies drawn from a simple economy of scarcity. In such an economy, capital improvements might have to rest on abstinence or on a serious diversion of national effort from consumption goods to production goods. But in our present economy, public works or capital goods are not, in the main, an alternative to consumption goods. In our modern economic flow, a sizeable increase in production goods can scarcely be brought about without at the same time effecting an increase in large categories of consumption goods. Additional machines and additional plants cannot be produced without giving employment to additional men, who will themselves require more consumption goods and who will in the process of their employment become armed with purchasing power to command these goods. Thus, it may not be said that we shall have more because we have consumed less. Rather, we shall have more because we have produced more, and producing more, we shall have consumed more.

If we can develop the requisite ingenuity and inventiveness, if we can bring about the requisite institutional adjustments and organization of the will-to-do, then we can provide here and now those things to which the American people aspire, subject only to the physical limitations of time and effort. As a current and dramatic example, the decision by the Congress and the Executive to do the things required in our defense program has set in motion a connected series of forces which will in time go far toward attaining the goal of full employment. Given our resources, equipment, techniques, and skills, only that decision—only that courageous implementation of the will-to-do—was required to release the log jam of idle plants and idle men. True, many of those "logs" will be long in reaching the mills, will require time in reaching their final stage of finished products, but the jam has been broken. It is an instructive commentary on our times that only under the threat of external aggression could we as a people summon the courage to implement this will-to-do. Let us, however, see to it that the lessons of this experience are not forgotten in the years ahead when post-emergency adjustments will call for like imagination and like courage. Let us remember also the sheer limits of time and effort; let us remember that in the catalog of physical limitations under which we operate our complex social and economic organization, large space must be devoted to the physical limitation of inertia. Let us, then, remember these things lest we wait too long in developing our plans for the next stage ahead.

However large our potentialities, we must see that good husbandry calls for putting first things first. Even in terms of the physical limitations of time and effort,

We must avoid wasting our national resources.

We must avoid spreading our activities too thinly.

We must concentrate on the more urgent undertakings.

To put first things first requires the exercise of value judgments. It requires the weighing of desirable things in many fields. These value judgments must, in our democratic society, reflect the will of the people on matters of national policy, as expressed through the appropriate agencies of government. Needless to say, these judgments must involve compromise.

Today, the Nation is confronted with a critical emergency of national defense, and in any such period we give ratings of high priority to any public undertakings that promise direct aid in defense preparations. This pressure is now being felt by the agencies of the Federal Government, and these agencies are re-orienting their programs in order to emphasize those

functions related to national defense. Such reorientation is both necessary and desirable, since on the successful outcome of our preparations may depend our future welfare.

Let it be noted, however, that the development of a strong, vigorous, and healthy national economy represents an essential phase of preparation for total national defense. Total war of our time has reverted to the ancient forms of tribal war and siege in which whole populations were involved, with all their resources affected and at stake. Military defense under these conditions becomes in reality economic and social defense as well as armed defense in the traditional sense. Thus, the defense techniques of total war far transcend military lines and must include within their scope such elements as industrial organization for ab-

normal production, both in amounts and in types; determination of priorities in output and in consumption; payments to military dependents; constructive use of the energies and skills of those whose normal activities are disrupted; provision of decent housing and adequate health protection; defense of morale; and many other activities essential to a healthy national life.

In giving high priorities to defense undertakings, therefore, we must not lose sight of those governmental activities that are vital to our long-term safety, such as the protection of our soil, the safeguarding of national health, the protection of morale, and the preparation for post emergency adjustments. In a broader sense, these too are measures of national defense.

B. TRENDS OF EMPLOYMENT

The Employment Stabilization Act requires estimates from time to time of the extent of unemployment and business activity that succeeding months may bring. Techniques for making such estimates reasonably reliable are being developed rapidly, and figures are being prepared by different methods, but the results are as yet only tentative. At the moment, then, we must be content with general rather than specific statements and short rather than long forecasts.

There will certainly be unemployment at the end of the fiscal year 1941 and of the calendar year 1941, and

in sufficient amount to demand the continuance of remedial action. Defense activity will make the total amount of unemployment a diminishing figure, and may even disclose shortages in certain special skills and in some localities. Yet the betterment in the sum total will not make easier the lot of those still out of work or their claim upon remedial measures less. For the next period of 12 months, therefore—and most probably the next 18 months—ample machinery and funds for the mitigation of unemployment must be maintained and provided.

EMPLOYMENT AND UNEMPLOYMENT IN THE UNITED STATES IN THE THIRD QUARTER OF SELECTED YEARS, 1929 - 1940

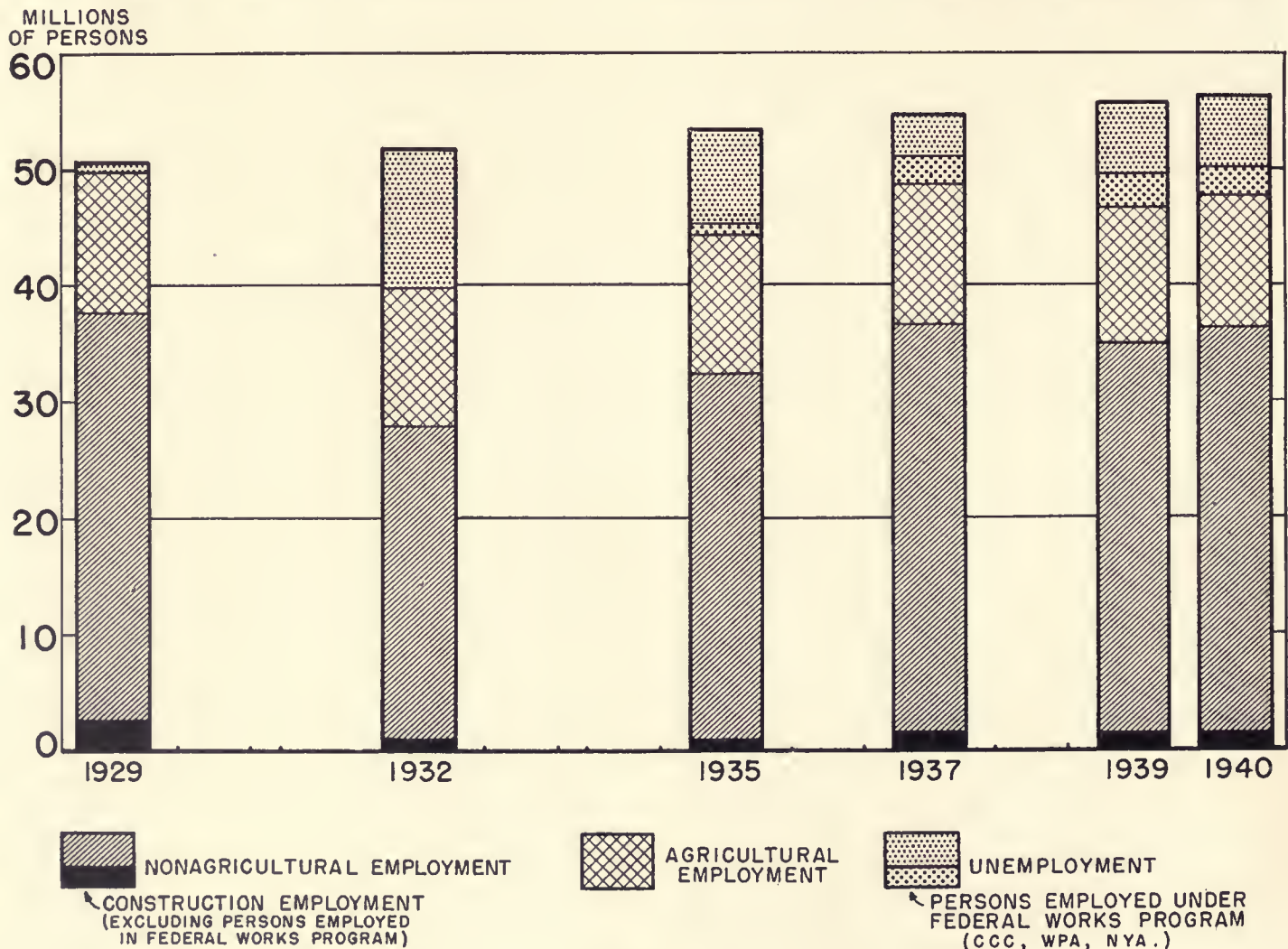


Chart 1

The problem of estimating unemployment is associated mainly with determining the probable number of nonagricultural workers associated with business and industrial operations. The number of workers associated with agriculture is fairly steady. There is little cyclical movement. The seasonality of the curve is quite regular, and the trend movement is almost a straight line. (Chart 1 and table 1.)

There is, however, a decided cyclical movement in the curve of non-agricultural employment. The number of workers is determined largely by the fluctuations of industrial production. The seasonality of total employment seems to be dominated largely by the seasonality of agricultural and construction employment, both of which are high in the summer and low in the winter. This is true even though the total of agricultural and of construction employment is less than one-third of the total number of workers in all industry. (Chart 2 and table 2.)

Another important factor in determining the amount of unemployment is involved in estimating the total number of gainful workers. The increase in this num-

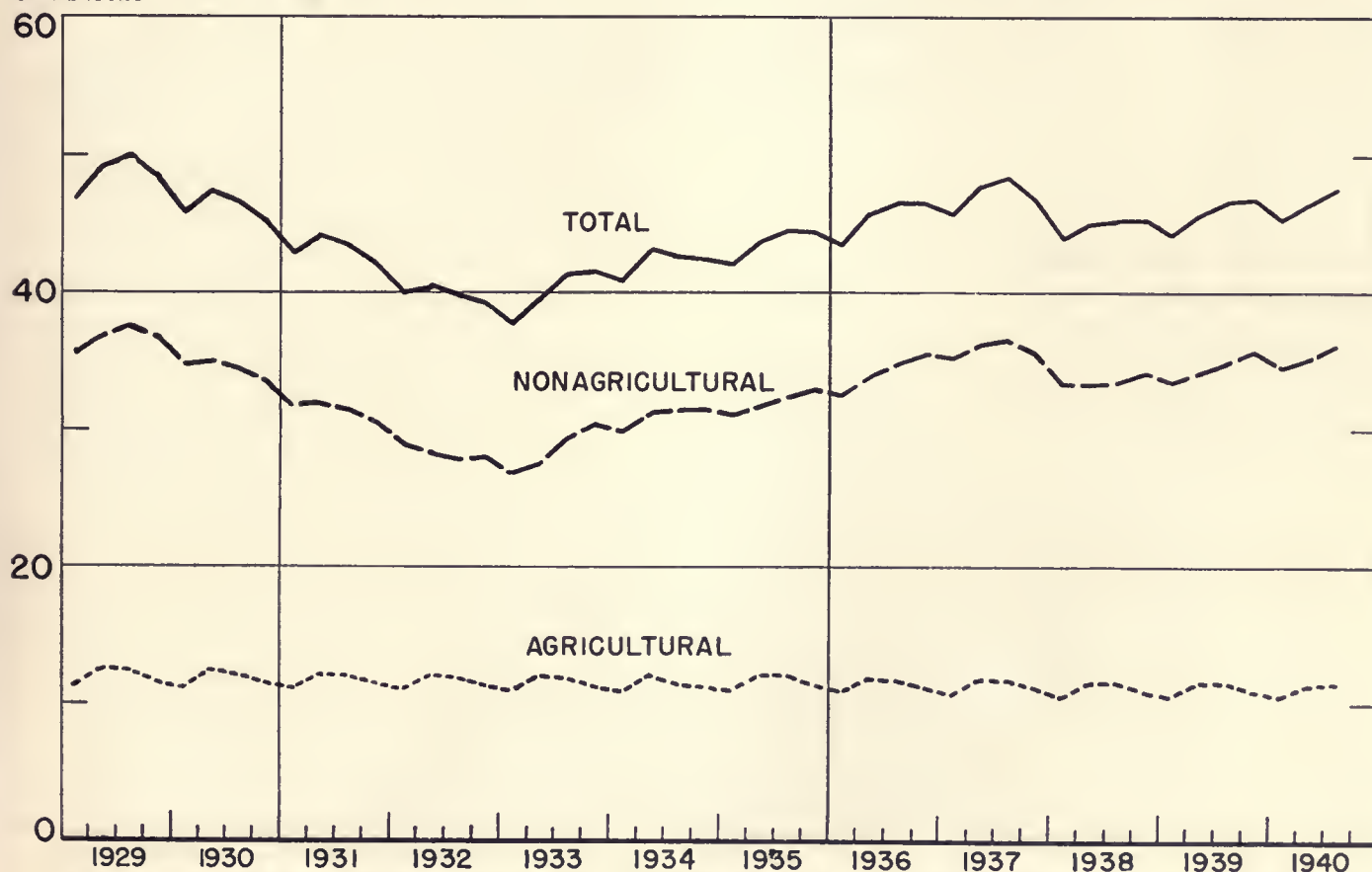
TABLE 1.—Employment in the United States by quarters, 1929-1940

[Based on averages of monthly data. Millions of persons]

Period	Total	Nonagri- cultural ¹	Agricu- lural ²
1929—1st quarter.....	46.8	35.6	11.2
2d quarter.....	49.2	36.8	12.4
3d quarter.....	49.9	37.6	12.3
4th quarter.....	48.6	36.9	11.6
1930—1st quarter.....	45.9	34.8	11.1
2d quarter.....	47.4	35.0	12.4
3d quarter.....	46.5	34.5	12.0
4th quarter.....	45.0	33.5	11.5
1931—1st quarter.....	42.9	31.8	11.1
2d quarter.....	44.1	32.0	12.1
3d quarter.....	43.6	31.6	12.0
4th quarter.....	42.1	30.6	11.5
1932—1st quarter.....	40.0	29.0	11.0
2d quarter.....	40.3	28.3	12.0
3d quarter.....	39.8	27.9	11.9
4th quarter.....	39.3	28.0	11.3
1933—1st quarter.....	37.8	26.8	11.0
2d quarter.....	39.6	27.5	12.0
3d quarter.....	41.3	29.4	11.9
4th quarter.....	41.6	30.2	11.3
1934—1st quarter.....	40.9	29.9	11.0
2d quarter.....	43.1	31.1	12.0
3d quarter.....	42.7	31.2	11.5
4th quarter.....	42.5	31.3	11.2
1935—1st quarter.....	42.1	31.1	11.0
2d quarter.....	43.9	31.8	12.1
3d quarter.....	44.5	32.4	12.1
4th quarter.....	44.4	33.0	11.4
1936—1st quarter.....	43.5	32.6	10.9
2d quarter.....	45.8	33.9	11.9
3d quarter.....	46.6	34.8	11.8
4th quarter.....	46.6	35.4	11.2

See footnotes at end of table.

EMPLOYMENT IN THE UNITED STATES, BY QUARTERS, 1929-1940

MILLIONS
OF PERSONS

Source: Nonagricultural Employment, Bureau of Labor Statistics, Dept. of Labor Agricultural Employment, Based on Data Published by Dept. of Agriculture

Chart 2

TABLE 1.—*Employment in the United States, by quarters, 1929-1940—Continued*

[Based on averages of monthly data. Millions of persons]

Period	Total	Nonagricultural ¹	Agricultural ²
1937—1st quarter.....	45.9	35.1	10.8
2d quarter.....	47.9	36.1	11.8
3d quarter.....	48.4	36.6	11.8
4th quarter.....	46.9	35.7	11.2
1938—1st quarter.....	44.0	33.4	10.6
2d quarter.....	45.0	33.3	11.7
3d quarter.....	45.2	33.5	11.7
4th quarter.....	45.2	34.2	11.0
1939—1st quarter.....	44.2	33.6	10.6
2d quarter.....	45.8	34.2	11.6
3d quarter.....	46.6	35.0	11.6
4th quarter.....	46.8	35.8	11.0
1940—1st quarter.....	45.3	34.7	10.6
2d quarter.....	46.5	35.2	11.3
3d quarter.....	47.5	36.1	11.4

¹ Nonagricultural employment based on monthly data of Bureau of Labor Statistics, Department of Labor.² Agricultural employment based on adjustments made to the data published by the Department of Agriculture on monthly estimates of agricultural employment

ber each year is estimated as slightly over 500,000. Most of the differences in estimates of unemployment are associated with different assumptions in regard to this total number of possible gainful workers. The Census of Unemployment in 1937 showed that the number of gainful workers was larger than had been expected, in view of estimates previously made of the increase of gainful workers in the period. One interpreta-

TABLE 2.—*Employment and unemployment in the United States in the third quarter of selected years, 1929-40**

[In millions of persons]

Year	Total employment	Nonagricultural employment			Agricultural employment ²	Estimated labor supply ⁴	Unemployment		
		Total ¹	Construction ³	Other			Total	Employed in Federal works program ⁵	Other
1929.....	49.9	37.6	2.7	34.9	12.3	50.6	0.7
1932.....	39.8	27.9	1.1	26.8	11.9	52.0	12.2
1935.....	44.5	32.4	1.1	31.3	12.1	53.4	8.9	1.1	7.8
1937.....	48.4	36.6	1.7	34.9	11.8	54.6	6.2	2.5	3.7
1939.....	46.6	35.0	1.6	33.4	11.6	55.8	9.2	3.0	6.2
1940.....	47.5	36.1	1.6	34.5	11.4	56.2	8.2	2.6	5.6

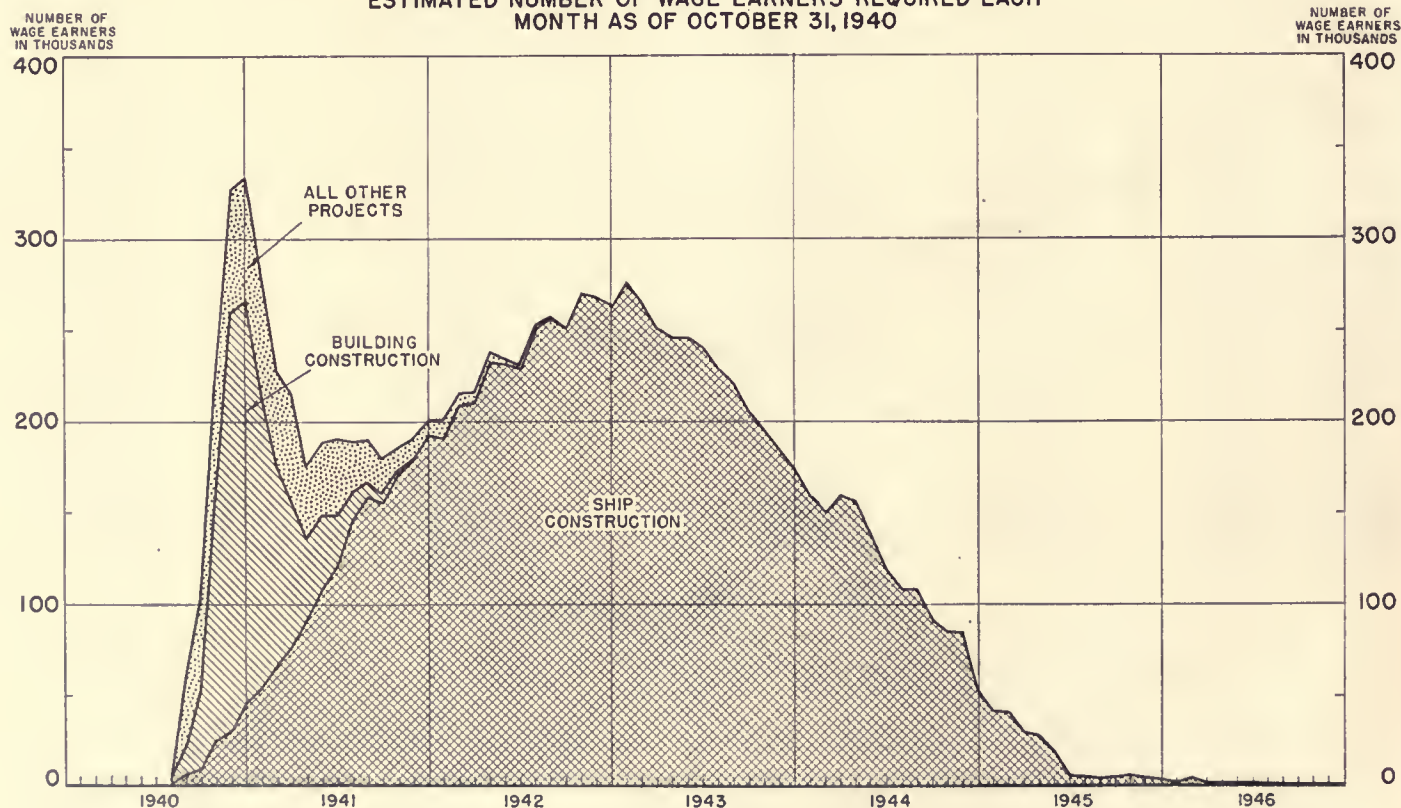
¹ From Bureau of Labor Statistics, Department of Labor.² Based on estimates made by the Work Projects Administration of the Federal Works Agency; excludes emergency construction employment (Federal and non-Federal), i. e., WPA, PRA, NIRA, and ERAA but includes PWA construction.³ Based on estimates of the Department of Agriculture.⁴ Based on estimates made by National Research Project of Work Projects Administration.⁵ Based on data compiled by the Social Security Board.⁶ Excludes 0.6 million persons in the labor supply who were absorbed in the Army and Navy.

* Estimated with data available Dec. 1, 1940.

tion of this difference is that the unemployment of a principal breadwinner tended to bring other members of the family into the labor market who would not ordinarily apply for work. Hence, in approaching full employment, employers would add fewer persons to their payrolls than the number listed as unemployed

NATIONAL DEFENSE CONSTRUCTION PROJECTS STARTED AFTER JUNE 1, 1940

ESTIMATED NUMBER OF WAGE EARNERS REQUIRED EACH
MONTH AS OF OCTOBER 31, 1940



Source: Bureau of Labor Statistics, Dept. of Labor

Chart 3

Yet this group of people not normally seeking work constitutes an important labor reserve under emergency conditions.

Another difficulty in estimating the number of available workers at the present time grows out of the emergency demands for special types of workers. Thus, older mechanics, who would not ordinarily be gainful workers, are induced to apply for jobs because of the defense program. In other words, the emergency itself may have some influence on the number of gainful workers. It can, therefore, be readily seen that no estimates can be better than approximations.

Estimates of unused manpower (or unemployment) are made by subtracting from the estimated number of gainful workers the number at work in private employment or normal governmental work.

The average numbers of actual unemployed are thus overstated, unless allowance is made for workers employed by work-relief agencies of government. During the calendar year, this number of persons has averaged about 2,500,000. During the first quarter of 1941, it may still be about 2,250,000, and during the second quarter about 2,000,000. For the remainder of the year, the amount of unemployment will decline still further if our estimates of a continued though unsteady rise of activity are justified. By some time in 1942, it would appear that we may be pushing at our reserves of manpower.

In estimating employment in the first two quarters of 1941, it has been possible to use the estimates of the rate and volume of expenditures under existing defense and other government contracts as a guide to total activity. While new contracts are continually being let, these data do give a rough guide as to what may be expected. (See chart 3 and tables 3 and 4.) One important characteristic of the construction contracts let up to October 1940 is the extent to which they are dominated by ship construction, both naval and merchant, which will dominate the employment requirements of government contracts as far ahead as the fall and winter of 1942-43.

From the standpoint of employment stabilization, the volume of public construction undertaken by the Federal Government has a special interest. Consequently, estimates in regard to employment and unemployment in the construction field are presented. Employment in the construction field is determined by first estimating construction expenditures with reference to construction contracts and, secondly, by relating construction employment to construction expenditures. The construction expenditures data were taken mainly from the previously unpublished estimates of the Work Projects Administration. (See tables 5 and 6.) They should be regarded as rough approximations, since no

TABLE 3.—National defense construction projects started after June 1, 1940. Estimated number of wage earners required each month on all national defense construction projects

[As of Oct. 31, 1940]

Month and year	All projects	Building construction	Ship construction	All other projects
1940:				
July.....	27,200	3,500	1,600	22,100
August.....	59,000	16,600	6,900	35,500
September.....	103,800	44,800	9,100	49,900
October.....	221,600	132,200	26,100	63,300
November.....	327,500	228,400	32,100	67,000
December.....	334,800	220,300	46,000	67,600
1941:				
January.....	281,400	160,900	54,500	66,000
February.....	229,000	108,800	67,000	53,200
March.....	216,400	77,300	77,900	61,200
April.....	176,100	48,900	87,200	40,000
May.....	189,300	41,500	108,200	39,600
June.....	181,800	26,800	122,600	32,400
July.....	189,800	15,200	147,500	27,100
August.....	190,400	8,200	159,300	22,900
September.....	180,500	5,600	156,100	18,800
October.....	186,800	1,700	172,300	12,800
November.....	192,420	20	180,000	12,400
December.....	202,800		193,000	9,800
1942:				
January.....	201,200		192,800	8,400
February.....	217,200		209,600	7,600
March.....	216,300		210,800	5,500
April.....	238,600		233,700	4,900
May.....	235,600		232,400	3,400
June.....	232,100		229,800	2,300
July.....	253,200		252,200	1,000
August.....	258,200		257,800	400
September.....	251,500		251,500	
October.....	271,500		271,500	
November.....	268,200		268,200	
December.....	264,500		264,500	
1943:				
January.....	276,600		276,600	
February.....	266,200		266,200	
March.....	251,500		251,500	
April.....	247,900		247,900	
May.....	247,200		247,200	
June.....	241,900		241,900	
July.....	229,600		229,600	
August.....	222,300		222,300	
September.....	205,900		205,900	
October.....	196,500		196,500	
November.....	185,300		185,300	
December.....	174,300		174,300	
1944:				
January.....	159,100		159,100	
February.....	150,600		150,600	
March.....	160,800		160,800	
April.....	157,700		157,700	
May.....	138,300		138,300	
June.....	118,700		118,700	
July.....	108,000		108,000	
August.....	108,600		108,600	
September.....	92,900		92,900	
October.....	85,200		85,200	
November.....	85,200		85,200	
December.....	53,600		53,600	
1945:				
January.....	43,000		43,000	
February.....	42,800		42,800	
March.....	30,700		30,700	
April.....	29,600		29,600	
May.....	20,000		20,000	
June.....	6,400		6,400	
July.....	6,200		6,200	
August.....	5,900		5,900	
September.....	6,700		6,700	
October.....	7,000		7,000	
November.....	5,300		5,300	
December.....	4,600		4,600	
1946:				
January.....	3,300		3,300	
February.....	5,300		5,300	
March.....	3,700		3,700	
April.....	3,000		3,000	
May.....	3,000		3,000	
June.....	3,400		3,400	
July.....	2,400		2,400	
August.....	2,000		2,000	
September.....	2,000		2,000	
October.....	2,000		2,000	
November.....	2,000		2,000	
December.....	2,000		2,000	

very accurate relationship can be established between contracts awarded and payments under the contracts. Furthermore, the number of workers attached to the construction industry fluctuates as workers are unem-

TABLE 4.—Construction expenditures in the United States, by quarters, 1940-41

(Millions of dollars)

Period	Public					Private ¹	Total	
	Federal, exclusive of defense ²	State and local government ³	National defense, exclusive of naval vessels ⁴	WPA ⁵	Total		Including WPA	Excluding WPA
1940:								
1st quarter.....	125	517	40	257	939	900	1,839	1,582
2d quarter.....	150	682	60	255	1,147	920	2,067	1,612
3d quarter.....	135	722	74	210	1,141	1,210	2,351	2,141
4th quarter.....	165	524	201	234	1,124	1,460	2,584	2,350
1941:								
1st quarter.....	140	550	250	234	1,174	1,020	2,194	1,960
2d quarter.....	160	730	275	180	1,345	1,500	2,845	2,665
Calendar 1939.....	590	2,320	140	1,043	4,093	3,690	7,783	6,740
Calendar 1940.....	575	2,445	375	956	4,351	4,490	8,841	7,885
Fiscal 1941.....	600	2,526	800	858	4,784	5,190	9,974	9,116

¹ Includes construction from regular Federal appropriations and from emergency appropriations (NIRA and EREA funds), but excludes national defense expenditures. Estimate for fiscal year 1941 is preliminary and subject to revision. The yearly figure was allocated by quarters according to the 1939 monthly employment pattern in regular and emergency Federal construction shown in *Construction Expenditures and Employment, 1936-39*, WPA. The estimates for the first 2 quarters of 1940 were based on fiscal year 1940, exclusive of defense expenditures, and allocated quarterly by the WPA monthly employment pattern of 1939.

² Includes construction from State and local funds, Federal loans and grants, excluding WPA but including Federal-aid highways. Total for calendar year 1940 estimated by Work Projects Administration with the use of Bureau of Labor Statistics data for the first 9 months of the year; quarterly figures derived by using the 1939 employment pattern for State and local government construction as shown in WPA publication cited in footnote (1) above. Estimates for first 2 quarters of 1941 are estimated at a slightly higher value than the previous 2 quarters on basis of incomplete information on appropriations.

³ Includes expenditures from regular appropriations and from supplementary appropriations since June 1940. First 2 quarters of 1940 based on fiscal year 1940 estimates; other quarters based on estimates of monthly defense expenditures on pay rolls and materials made by the Construction and Employment Division of Bureau of Labor Statistics.

⁴ Estimates of WPA based on monthly schedule of employment supplied in connection with the 1940-41 Relief Bill; first and second quarters, 1940, are actual employment reported by WPA; for other quarters estimated employment was converted to expenditures by multiplying by average per man cost per quarter of \$180.

⁵ Includes new residential, other building construction, and utilities construction. The data for the quarters of 1940 were based on F. W. Dodge estimates of value of contracts; the first and second quarters were estimated from a relationship between national income produced by quarters and private construction expenditures by quarters (adjusted for seasonal variation) from 1925-39. The estimates were obtained from the relationship for a national income of 79 billions of dollars (annual rate) for first quarter of 1941 and for 82 billions of dollars for second quarter.

ployed or shift to other occupations. Both the direct and indirect employment resulting from such activity must be taken into account, since direct, on-the-site employment is only about half the total employment resulting from given contracts.

But the chief interest in the data relates to the probable status of construction employment in the second half of the fiscal year 1941. Since a large fraction of the total employment on construction work is common labor, it is necessary to estimate the amount of skilled and semi-skilled construction labor involved before determining whether there will be a shortage of labor supply in the construction field. (See table 7.)

It appears from this analysis that there are likely to be about 365,000 skilled and semiskilled workers still available in the construction field by the end of the fiscal year 1941, and 1,443,000 of such workers employed. Even if this estimate is accurate, there may still be a scarcity among certain types of skilled and semiskilled construction workers in various localities.

TABLE 5.—Construction employment in the United States, by quarters, 1940-41

(Average number of persons, in thousands)

Period	Public					Private ¹	Total	
	Federal, exclusive of defense ²	State and local government ³	National defense, exclusive of naval vessels ⁴	WPA ⁵	Total		Including WPA	Excluding WPA
1940:								
1st quarter....	153	414	32	1,610	2,209	900	3,109	1,499
2d quarter....	173	546	48	1,300	2,067	920	2,987	1,687
3d quarter....	161	578	49	1,166	1,964	1,125	3,089	1,923
4th quarter....	198	419	161	1,300	2,078	1,358	3,436	2,136
1941:								
1st quarter....	151	423	167	1,300	2,041	927	2,968	1,668
2d quarter....	177	487	183	1,000	1,847	1,364	3,211	2,211
Calendar 1939....	185	397	28	1,750	2,361	905	3,266	1,616
Calendar 1940....	171	489	75	1,344	2,079	1,076	3,155	1,811
Fiscal 1941....	172	477	142	1,200	1,991	1,193	3,184	1,984

¹ Based on average man-year cost for regular Federal construction and for emergency Federal construction in 1939. The expenditures between these two categories were derived by applying the ratio of 0.316 of total for the emergency Federal expenditures (based on 1939 experience). The man-year cost used for regular Federal construction was \$5,190 and for emergency Federal, \$1,950; for the first 2 quarters of 1941 the man-year costs were increased by 10 percent to account for expected higher building costs.

² Employment derived from man-year cost experience of 1939; for 1941 the man-year cost was increased by 10 percent.

³ Derived from man-year cost of regular Federal construction; for 1941 the man-year cost was increased by 10 percent. This procedure gives estimates which agree closely with those derived by a more elaborate process by the Construction and Employment Division of the Bureau of Labor Statistics.

⁴ For the first 3 quarters of 1940, data are actual as reported by WPA; for the other quarters employment is derived by assuming an average man-quarter cost of \$180.

⁵ Based on man-year cost of 1939; for the fourth quarter the man-year cost was increased by 5 percent, based on increase in construction costs shown by the *Engineering News Record* between October 1939 and October 1940; for 1941 the man-year cost was increased by 10 percent.

TABLE 6.—Construction employment—skilled and semiskilled workers, by quarters, 1940-41¹

(Average number of persons, in thousands)

Period	Public					Private ¹	Total	
	Federal, exclusive of defense ²	State and local government ³	National defense, exclusive of naval vessels ⁴	WPA	Total		Including WPA	Excluding WPA
1940:								
1st quarter....	72	310	24	402	808	675	1,483	1,081
2d quarter....	83	410	36	325	854	690	1,544	1,219
3d quarter....	76	434	44	292	846	844	1,690	1,398
4th quarter....	95	314	121	325	855	1,018	1,873	1,548
1941:								
1st quarter....	72	317	125	325	839	695	1,534	1,209
2d quarter....	93	365	137	250	845	1,023	1,868	1,618
Calendar 1939....	81	298	21	438	838	679	1,517	1,079
Calendar 1940....	82	367	56	336	841	807	1,648	1,312
Fiscal 1941....	84	358	106	300	848	895	1,743	1,443

¹ Based on table Construction employment in the United States, by quarters, 1940-41. For all regular Government construction employment and private construction employment, it was assumed that 75 percent of all employed consists of skilled and semiskilled workers (based on figures furnished by Bureau of Labor Statistics). For WPA and Federal Emergency employment it was assumed that 25 percent of employed consists of skilled and semiskilled workers (based on estimate made by WPA).

In the estimate, the number of skilled and semiskilled workers attached to the industry has been taken as constant for the period, while the total number at the beginning of the period was based upon the Census of Unemployment in 1937. It should be noted, however, that the estimated increase in the employment of skilled and semiskilled workers in the second quarter of 1941 over the first quarter will be about 400,000, or

TABLE 7.—Construction labor force and unemployment of skilled and semiskilled workers, by quarters, 1940-41

Period	Labor force attached to construction, including emergency workers ¹	Construction employment, excluding WPA workers ²	Indicated unemployment of construction workers, including WPA workers ³
1940:			
1st quarter.....	1,983	1,081	902
2d quarter.....	1,983	1,219	764
3d quarter.....	1,983	1,398	585
4th quarter.....	1,983	1,548	435
1941:			
1st quarter.....	1,983	1,209	774
2d quarter.....	1,983	1,618	365
Calendar 1939.....	1,983	1,079	904
Calendar 1940.....	1,983	1,312	671
Fiscal 1941.....	1,983	1,443	540

¹ Based on Census of Unemployment, 1937.² From table on construction employment—skilled and semiskilled, by quarters, 1940-41.³ Difference between labor force and employment.

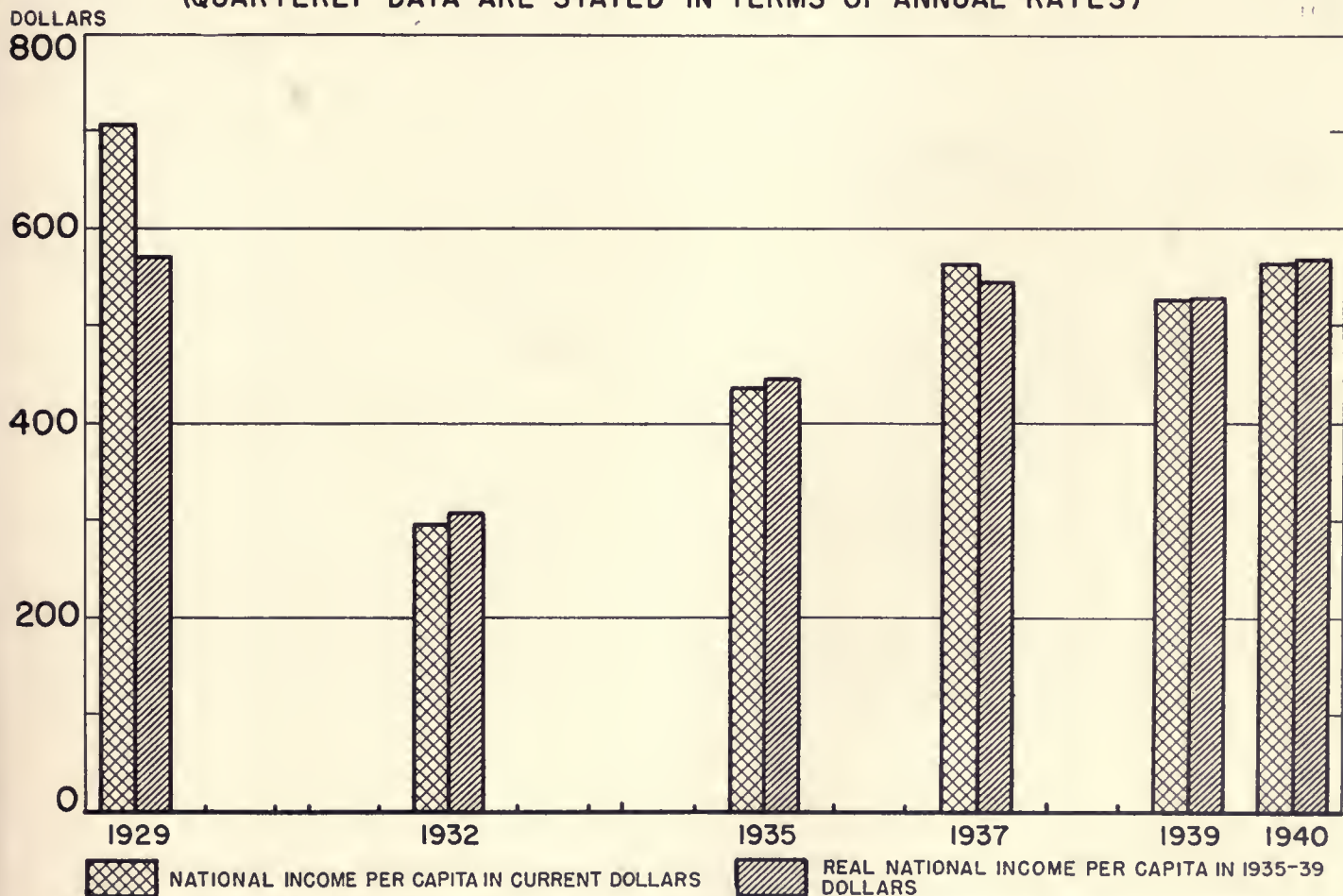
more than the balance of the unemployed skilled construction workers available at the end of the year. Thus, there appears a need for new workers to be trained in this type of work.

Conclusion

If the employment problem be reviewed in the light of these data, it appears that its solution must be found mainly through expansion in the nonagricultural activities. The demands for construction workers during the coming months of 1941 will doubtless call for new skilled workers in these trades. Manufacturing enterprise will be calling for new workers, as will government and the commercial activities. However, the high level of manufacturing production arising from the defense program cannot be maintained after the defense pro-

NATIONAL INCOME PRODUCED, PER CAPITA, FOR THIRD QUARTER OF SELECTED YEARS

(QUARTERLY DATA ARE STATED IN TERMS OF ANNUAL RATES)



Source: Data Based on Income Payments of Dept. of Commerce, Adjusted, and Population Estimates of the Bureau of the Census, Dept. of Commerce.

Chart 4

gram has been completed unless some other fields can be found to take the place of the defense program. In case full employment should involve military priorities in the field of construction and in other durable goods industries, a backlog of demand might be created which would be serviceable at the end of the defense program in the direction of the maintenance of the high level of employment that is likely to be attained during this program.

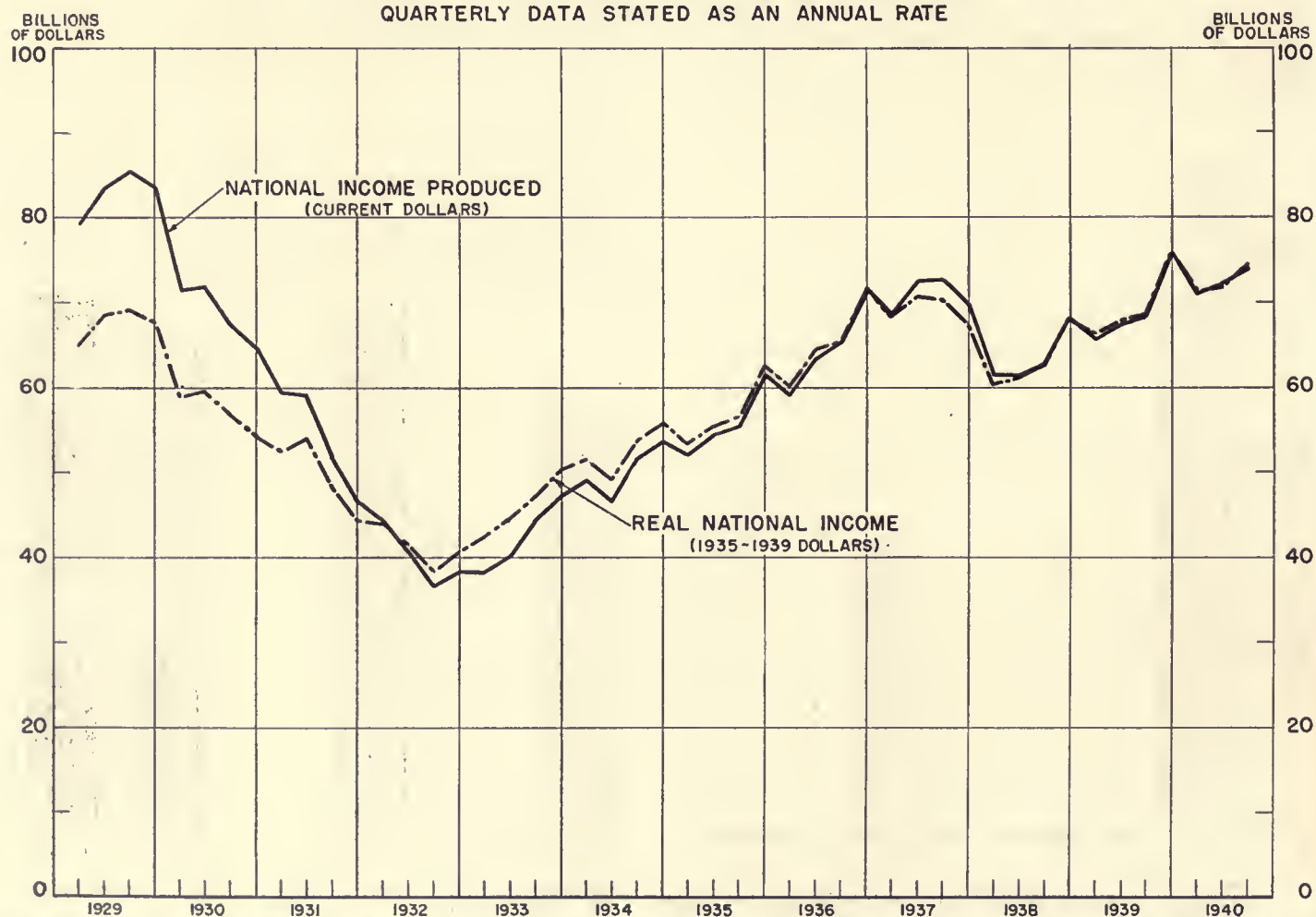
If it proves to be possible to approach full employment without a material rise in the level of prices, this also would be an achievement tending to reduce the readjustments involved in shifting an enlarged portion of total output into the field of goods for civilian consumption. In order to secure such a favorable post-defense economic situation, it will be necessary, as full employment is approached, to finance defense activities mainly from current savings, which high levels of production will make possible. But a high level of prices

in a period of readjustment and curtailment of national income would have drastic consequences for attempts to maintain a high level of employment.

The importance of price levels in relation to national income cannot be overemphasized. Changes in price levels must be considered not only in estimating business activity but also in measuring the well being of the people as a whole. Thus, a study of the national income for the past few years shows that a significant mark was passed during the third quarter of 1940. At that time, the average real income per person just about equalled the highest previous figure on record. This estimate is made by adjusting the national income for price changes and dividing by the number of the population. (Charts 4 and 5 and tables 8 and 9.)

It must be noted at once that this is an average figure. It does not mean that each person is as well off in terms of his access to goods and services. Some have doubtless benefited more than others, and some

NATIONAL INCOME PRODUCED, BY QUARTERS, 1929-1940
QUARTERLY DATA STATED AS AN ANNUAL RATE



Source: National Income Data Based on Income Payments Series Published by the Dept. of Commerce; Real National Income Is Given by National Income Deflated by Bureau of Labor Statistics Cost of Living Index

Chart 5

are below the 1929 level. Just how this average gain has been distributed we do not know. We do know that the largest increase has been in those goods that

TABLE 8.—National income produced, by quarters, 1929–40
[Quarterly income data stated as an annual rate]

Period	National income produced (billions of dollars) ¹	Cost of living (1935–39=100) ²	Real national income (billions of 1935–39 dollars) ³
1929:			
1st quarter.....	79.3	121.9	65.0
2d quarter.....	83.5	121.7	68.6
3d quarter.....	85.3	123.4	69.1
4th quarter.....	83.5	123.4	67.7
1930:			
1st quarter.....	71.6	121.4	59.0
2d quarter.....	71.9	120.7	59.6
3d quarter.....	67.3	118.2	57.0
4th quarter.....	64.7	116.8	54.2
1931:			
1st quarter.....	59.5	113.2	52.6
2d quarter.....	59.2	109.6	54.0
3d quarter.....	51.9	107.9	48.1
4th quarter.....	46.6	105.1	44.4
1932:			
1st quarter.....	44.3	100.7	44.0
2d quarter.....	40.7	98.1	41.5
3d quarter.....	36.9	96.3	38.3
4th quarter.....	38.3	94.3	40.7
1933:			
1st quarter.....	38.2	89.9	42.5
2d quarter.....	40.1	89.5	44.8
3d quarter.....	44.2	93.7	47.1
4th quarter.....	47.3	94.2	50.2
1934:			
1st quarter.....	49.0	94.7	51.7
2d quarter.....	46.7	95.2	49.1
3d quarter.....	51.7	95.9	53.9
4th quarter.....	53.8	96.2	55.9
1935:			
1st quarter.....	52.1	97.5	53.4
2d quarter.....	54.4	98.3	55.3
3d quarter.....	55.4	97.7	56.7
4th quarter.....	61.5	98.4	62.5
1936:			
1st quarter.....	59.1	98.2	60.2
2d quarter.....	63.4	98.5	64.3
3d quarter.....	65.3	99.7	65.5
4th quarter.....	71.4	99.7	71.6
1937:			
1st quarter.....	68.8	101.0	68.2
2d quarter.....	72.6	102.5	70.8
3d quarter.....	72.6	103.4	70.2
4th quarter.....	69.7	103.7	67.2
1938:			
1st quarter.....	61.4	101.6	60.4
2d quarter.....	61.5	100.8	61.0
3d quarter.....	62.9	100.5	62.6
4th quarter.....	68.1	100.2	68.0
1939:			
1st quarter.....	65.8	99.4	66.2
2d quarter.....	67.3	99.0	67.9
3d quarter.....	68.4	99.5	68.7
4th quarter.....	75.9	100.0	75.9
1940:			
1st quarter.....	71.0	99.9	71.1
2d quarter.....	72.0	100.4	71.7
3d quarter.....	74.0	100.4	74.3

¹ Based on monthly data on income payments of the Department of Commerce. The income payments are adjusted to yield income paid out and an estimated monthly business savings added to obtain income produced. The annual monthly totals are further adjusted so as to agree with the Department of Commerce annual data on income produced.

² Bureau of Labor Statistics, Department of Commerce; quarterly averages obtained from monthly data; data for months not reported by Bureau of Labor Statistics obtained by interpolating with the monthly indexes of the National Industrial Conference Board.

³ National income divided by the cost of living index.

make up about 60 percent of consumer purchases, i. e., the perishable goods and services, such as food, gasoline, doctor services, and recreation. These were produced in amounts slightly larger per person than in 1929. Semidurable goods, which consist of such items as clothing and automobile tires, and which make up about 5 percent of consumer purchases, were produced in slightly less quantities than in 1929. Durable consumer goods, which consist of such articles as household furnishings and automobiles and make up another 5 percent of consumer expenditures, were produced in considerably less volume than in 1929. Housing, which makes up the remainder of the consumer's budget, was also available in less quantity than in 1929. (Table 10.)

TABLE 9.—National income produced, per capita, for third quarter of selected years

[Figures are stated on an annual rate]

Year	National income per capita in current dollars	Real national income per capita in 1935–39 dollars
1929.....	\$701	\$568
1932.....	295	306
1935.....	434	444
1937.....	561	543
1939.....	522	524
1940.....	562	564

Source: Based on income payments of the Department of Commerce, adjusted, and estimates of population of the Bureau of the Census, Department of Commerce.

TABLE 10.—Consumers' outlay for perishable, semidurable, and durable commodities and for services, 1929–40 ¹

[In millions of current dollars]

Year	Commodities				Services	Total
	Perishable	Semidurable	Durable	Total		
1929.....	28,550	12,382	9,913	50,845	22,497	73,342
1930.....	26,395	10,731	7,550	44,676	24,385	69,061
1931.....	21,481	9,024	5,748	36,253	20,035	56,288
1932.....	18,147	6,722	3,806	28,675	15,380	44,055
1933.....	18,133	6,513	3,882	28,528	13,742	42,270
1934.....	20,756	7,512	4,686	32,954	16,750	49,704
1935.....	23,095	8,151	5,918	37,164	15,071	52,235
1936.....	25,363	9,200	7,342	41,905	17,000	58,905
1937.....	26,706	9,720	7,664	44,090	18,000	62,090
1938.....	25,503	8,992	5,410	39,904	17,700	57,604
1939.....	26,000	9,850	7,250	43,100	18,300	61,400
1940.....	27,000	10,300	7,700	45,000	18,500	63,500

¹ Data for the commodity components of consumers' outlay for 1929 through 1938 from Kuznets, *National Income and Capital Formation, 1919–35* (1937) and *Commodity Flow and Capital Formation in the Recent Recovery and Decline, 1935–38* (1939); the consumers' services component through 1935 are taken from the former study. The consumers' services component for 1936 through 1938 represent estimates by Martin Taitel on the basis of data compiled by V. L. Bessie.

C. PUBLIC WORKS PLANNING FOR EMPLOYMENT STABILIZATION

When Adam Smith, a century and a half ago, listed the construction of public works as one of the appropriate functions of government he stated no new principle. The provision of the physical facilities needed for the service of the community as a whole has traditionally been considered a proper responsibility for government finance and administration. In our own country, the construction of highways, waterways, and lighthouses to facilitate commerce and trade, sewerage systems and water supplies to minister to the public health and convenience, and fortifications to provide for the common defense, to name but a few types, have been undertaken by government since our earliest days.

It was recognized long ago that activities such as these presented opportunities for job creation during recurring periods of widespread unemployment. Jurisdiction over the work is wholly in the hands of public bodies, a large proportion of the labor required needs no special skill, and the work is widely spread geographically. Before the Civil War, New York City could have been observed improving Central Park and building new streets in response to demand that work be provided for the unemployed during the winter of 1857-58. Boston, in 1875, provided jobs for its needy unemployed by putting them to work on grading its streets, breaking stones, and removing rock from ledges. Milwaukee, in 1894, hired a large group of unemployed men to make street improvements that had been contemplated but never begun. In 1914-15, more than 50 cities reported resorting to some form of public construction operation for the relief of unemployment. All these efforts were largely in terms of providing jobs for needy people, rather than in terms of attempting to influence the forces that had caused the unemployment in the first place.¹

Public Works for Cyclical Stabilization

In later years, proposals had been made by legislators, business men, publicists, and economists that the downswing of the business cycle be subjected to some degree of control by adjustments in the level of public construction activity. Opinions differed as to precisely how that control should be exercised and as to how effective it might be under varying circumstances, but in general the proposals focused on the normal construction operations of government and contemplated

timing of activities so that expenditures would be low during periods of business prosperity and high during depressions.

For example, "the minority report of the British Poor Law Commission of 1905 * * * advocated not relief work of the [sort that had formerly been relied upon during periods of unemployment] but rather a scheduling of regular public works and regular government purchases in such a way that a larger amount would be done when private business was less active and a smaller amount when private business was more active, with the idea that this would serve as a regulator and stabilizer of the total economic activity of the nation".²

In this country, as early as 1919, a United States Emergency Public Works Board had been proposed to Congress, which would cooperate with Federal, State, and municipal agencies in stimulating public construction in times of depression. In 1923, the principle of planned public construction received the endorsement of the President's Conference on Unemployment, and following the submission of its report, a bill was introduced into Congress "to prepare for future cyclical periods of depression and unemployment by systems of public works," which provided for advance preparation of engineering plans by the various departments of the Federal Government and gave broad powers to the President in retarding or expediting projects. In 1926, an amendment was proposed to the public buildings bill in Congress to provide that "the Secretary of the Treasury shall take into consideration the stabilizing effect governmental construction policy may exert upon general employment and industrial activity, and shall report to Congress with recommendations whenever the volume of construction for the United States during any period falls one-third below the volume of the corresponding period of 1925."³

During the seventy-third session of Congress, Senator Wagner introduced a bill which, after some modification, was passed in February 1931, as the Employment Stabilization Act. That act declares that it is "the policy of Congress to arrange the construction of public works so far as practicable in such manner as will assist in the stabilization of industry and employment through the proper timing of such construction, and that to further this object there shall be advance planning, including preparation of detailed construction plans, of public works by the construction agencies and the

¹ J. M. Clark, *Economics of Planning Public Works*, p. 9.

² See L. H. Feder, *Unemployment Relief in Periods of Depression*, Russell Sage Foundation, 1936.

³ See Gayer, A. D., *Public Works in Prosperity and Depression*; J. M. Clark, *Economics of Planning Public Works*. Wolman, Leo, *Planning and Control of Public Works*.

board." It provides that Federal departments engaged in construction should prepare six-year programs of their construction projects and that in the event of an impending state of business depression, the President is requested to report to Congress on the appropriation needed to undertake sufficient public construction to "aid in preventing unemployment." The act also states, "The board shall collect information concerning advance construction plans and estimates by States, municipalities, and other public and private agencies which may indicate the probable volume of construction within the United States or which may aid the construction agencies in formulating their advance plans".

Local Government Public Works

It is important to note that during the high tide of the twenties, no widespread curtailment could be made in the volume of public works expenditure, as called for by the early proposals for stabilization. Whether or not the level of expenditures during that period was higher than "normal" must depend upon the rather difficult determination of what "normal" is. It is certain that local governments were striving valiantly during those prosperous years to catch up with the demands made upon community plant by an unprecedented rate of urban growth, by the rapid expansion of the use of the automobile, and by the high level of industrial production. Borrowing for new public facilities may have been greater than could be supported by future public revenues, but we have the advantage of hindsight when we express this judgment. It would be difficult to demonstrate that there was any widespread construction of unneeded facilities. (It may be noted that most of the excesses that appeared were in the area of special-assessment improvements undertaken in connection with real estate booms.) Late in the twenties, cities were still typically under-provided with the streets, sewers, water systems, school buildings, and other items of community equipment that modern urban living conditions demand.

However, the fact remains that in 1930 the level of State and local public expenditures for construction was at a high point. It was not unnatural, therefore, that the first effect of declining business activity, with its concomitants of lowered real estate values, declining tax collections, reduced bonding limits, and shrinking credit facilities, should have been a rapid decrease in State and local public construction activity, a decrease that added materially to the deflation already well under way.

First National Efforts to Expand Public Works

A few days before the close of 1930, when the forces of depression were rapidly gaining strength in their steady onslaught against the level of business activity and when the number of unemployed workmen was already a matter of grave concern throughout the country, the Congress passed the Supplemental Emergency Construction Appropriation Act, which increased by \$116,000,000 the Federal Government's expenditures for construction. That action marked the beginning of the efforts made during the past 10 years to utilize public construction activity as a counteraction to depression forces. More ambitious recommendations for Federal Government expenditure had been made to President Hoover by his Emergency Committee for Employment, under the chairmanship of Col. Arthur Woods, but in presenting his message to Congress on December 2, 1930, the President had stated that he did not feel warranted in asking for an appropriation of more than from \$100,000,000 to \$150,000,000. The congressional appropriation of \$116,000,000, bolstered by the Woods Committee's exhortation to local governments to accelerate their public works programs, was then deemed adequate for the situation faced by the Nation.

"Encouragement" of local public works construction, however, proved ineffective in the face of steadily declining local government revenues, and the amount of Federal funds made available was seen to be insufficient to make appreciable inroads on the steadily mounting army of unemployed. Throughout 1931, the depression deepened, and proposals multiplied that the Federal Government apply itself energetically to combat the decline in business and employment by more strenuous stimulation of public construction. In a sense, the culmination of these proposals was the passage in that year of the Employment Stabilization Act.

On July 21, 1932, President Hoover approved the Emergency Relief and Construction Act. In that act, \$322,224,000 was appropriated for Federal public works (including \$120,000,000 for supplementary grants for Federal-aid highways), and, more significantly, \$1,500,000,000 was made available to the Reconstruction Finance Corporation for loans for "self-liquidating" local public works projects. Before long, however, it was discovered that the self-liquidating-project formula was ineffective in achieving its announced objective of stimulating local government construction activity. The scheme was doomed to failure by the sheer lack of enough local projects capable of being financed on the toll-bridge principle. By the end of 1933, the Reconstruction Finance Corporation had disbursed little more than \$60,000,000 for such projects.

The PWA Established

In the dramatic days that followed the inauguration of a new administration in the spring of 1933, a new formula for public works expenditure was hammered out and enacted into law on June 16, as title II of the National Industrial Recovery Act. The act provided that grants-in-aid could be made to States and to local governments for the building of public improvements, up to 30 percent of the cost of labor and materials,⁴ and that loans could be extended for the remainder of the project cost. Self-liquidation was no longer required, and \$3,300,000,000 of Federal funds was made available. Provision was also made for loans to limited-dividend housing corporations and to railroads for the modernization of plant and equipment. For the administration of the funds, there was established the Federal Emergency Administration of Public Works, a name almost immediately shortened in popular usage to PWA.

For a variety of reasons,⁵ the new program of public works was slow in getting under way. The unemployed were not rapidly absorbed, and in November, \$400,000,000 of the public works fund was used to establish the Civil Works Administration, a force-account construction agency, to do improvement work for local governments entirely at Federal expense. It was provided that at least half of the labor employed should be taken from the relief rolls. In less than a month, the CWA found enough temporary projects to employ 4,000,000 men, but by March 31, 1934, the funds allotted to it had been spent, and the agency was discontinued.

Development of the Work Relief Program

Attention was now being directed more and more strongly to efforts to give work of some sort to the millions of men on the relief rolls, and the Federal Emergency Relief Administration, created at about the same time as the PWA for the purpose of aiding the States in their direct-relief programs, set up a Work Division to continue the activities inaugurated by the CWA. When, in the following year, the Emergency Relief Appropriation Act of 1935 was passed, its stated purpose was "to provide relief, work relief and to increase employment by providing for useful projects." That act appropriated \$4,880,000,000, and the goal set for its administration was the employment by December 15, 1935, of 3,500,000 men drawn from the relief rolls. The PWA was continued as an agency in the administration of the new program, with its grant-making authority changed to provide grants to local

governments up to 45 percent of project costs.⁶ For that purpose, the act allocated \$900,000,000. But major reliance was placed upon the Works Progress Administration, a new work-relief agency established by executive order, as authorized in the act, and local government public improvement construction began to be undertaken more and more with a work-relief objective.

In 1936, another Emergency Relief Appropriation Act was passed, providing now but \$300,000,000 for the PWA type of activity, and that only from funds already on hand or to be raised by the re-sale of securities purchased under previous programs. For work-relief activities, \$1,425,000,000 was appropriated.

In 1937, to allow the PWA to make allotments for projects whose sponsors had already undertaken commitments of one sort or another in anticipation of Federal aid, Congress authorized the RFC to acquire securities up to \$400,000,000 and the PWA to increase the amount of grants from the revolving fund from \$300,000,000 to \$359,000,000. In 1938, following the alarming decline in employment that attended the latter part of 1937, provisions for public works funds were again raised by an appropriation of \$965,000,000 to the PWA. In both those years, very much larger sums had been appropriated for work relief. The appropriation in 1938 was the last one made to the PWA.

During all the years reviewed in the preceding paragraphs, the regular Federal appropriations had included amounts for construction operations under the jurisdiction of Federal agencies. These amounts do not indicate the whole extent of Federal construction, however, for generous allotments for that purpose were also made from the emergency appropriations each year. Actual expenditures for Federal construction rose from \$195,000,000 in 1930 to \$660,000,000 in 1940.

From the foregoing history of the Federal appropriations for public works since 1930, it can be seen that the emphasis in the earlier part of the period was placed upon increasing public construction activity as a means of regenerating business activity. Employment of men on the site of construction was not the only purpose in view. It was hoped that the materials orders involved in the construction would serve to stimulate heavy industry and, furthermore, that the re-spending of wages received through direct or indirect employment would itself have a beneficial effect upon the country's economic health. As the depression continued, this view was gradually replaced by one that emphasized construction-site employment of men taken from the relief rolls. Administrative policies were aimed at obtaining the maximum yield of such employment from the funds available.

⁴ In the administration of the act, the 30 percent figure was applied to all such projects receiving grants. In other words, all grants made were at the maximum authorized by law.

⁵ See p. 20.

⁶ In practice, the 45 percent was applied to all projects, although in the law it was established as a maximum.

It can be said, therefore, that decreasing reliance was placed upon the effects of public works expenditures in stimulating business recovery, and that in the later years of the period, such expenditures had as their major objective the alleviation of the distress caused by unemployment.

The Course of Public Construction

It can be seen from table 1 that Federal expenditures for public construction showed a great increase as a result of the congressional appropriations. However, the increase in funds appropriated was not fully translated into an increase in actual construction activity until some time after the first major congressional enactment of 1933. The high year of actual construction volume financed in whole or in part by Federal funds was 1936, after which the total began to fall off. Furthermore, it can be seen from table 1 that increased expenditures on Federal projects represented but a minor part of the total rise.

TABLE 1.—Estimated expenditures of Federal funds for new public construction (1925–38)

[Millions of dollars]

Calendar year	Federal construction projects	PWA grants and Federal aid for State highways	Work relief expenditures	Total Federal funds expended for construction
1930.....	190	117	-----	307
1931.....	250	172	-----	422
1932.....	283	177	-----	460
1933.....	312	197	138	647
1934.....	368	297	715	1,380
1935.....	427	360	447	1,234
1936.....	501	612	1,222	2,335
1937.....	524	525	994	2,043
1938.....	475	404	1,206	2,085
1939.....	553	610	1,043	2,206
1940.....	¹ 999	¹ 332	¹ 950	¹ 2,281

¹ Preliminary estimates.

During the earlier part of the period under examination, State and local governments were feeling the pinch of declining revenues and were drastically decreasing their rate of public works spending. If their construction is added to that financed by the Federal Government, as is done in table 2, a better picture of the total effect can be gained.

Public construction activity began to decline immediately after 1930, and reached a low point in 1932 that was not much more than half the pre-depression volume. It rose slowly during 1933, 1934, and 1935, but did not surpass the 1930 figure until 1936, and then only by virtue of the expenditures made for work relief. If the work-relief activity is excluded from the total, it can be seen that the amount of public construction carried on by normal procedures has never been greater than the volume of public construction during the pre-depression period.

An even better understanding of the effectiveness of Federal appropriations can be obtained by considering also the extent to which the depression affected the level of private business expenditures for construction. Pri-

TABLE 2.—Estimated expenditure of public funds for new public construction ¹ (1925–38)

[Millions of dollars]

Calendar year	Public construction financed by Federal funds	Public construction financed by State and local funds	Total public construction
1930.....	307	2,469	2,776
1931.....	422	2,150	2,578
1932.....	460	1,334	1,794
1933.....	647	707	1,354
1934.....	1,380	794	2,174
1935.....	1,234	616	1,850
1936.....	2,335	881	3,216
1937.....	2,043	845	2,888
1938.....	2,139	1,089	3,228
1939.....	2,085	1,103	3,188
1940.....	2,206	1,314	3,520
.....	¹ 2,281	¹ 1,143	¹ 3,424

¹ Including work-relief construction.

² Preliminary estimates.

TABLE 3.—Total estimated expenditures for new construction in the United States (1925–38)

[Millions of dollars]

Calendar year	Private construction expenditures	Expenditures for public construction ¹	Total expenditures for construction ¹
1930.....	5,941	2,776	8,717
1931.....	3,712	2,578	6,290
1932.....	1,767	1,794	3,561
1933.....	1,091	1,354	2,445
1934.....	1,232	2,174	3,406
1935.....	1,605	1,850	3,455
1936.....	2,551	3,216	5,767
1937.....	3,443	2,888	6,331
1938.....	3,072	3,188	6,260
1939.....	3,491	3,520	7,011
1940.....	¹ 3,985	¹ 3,434	¹ 7,419

¹ Including work-relief construction.

² Preliminary estimates.

vate construction has normally been several times as great as public construction. But the depression hit hard at private building. In 1930 it was already dropping fast, and it reached an extreme low in 1932, when it was even less than public construction, which was itself at its low point. Although private construction began to revive after 1933, it has not yet begun to approach its pre-depression volume of about \$8,000,000,000 annually.

What 10 Years of Experience Have Shown

The past 10 years have provided a rich experience in the utilization of public construction as a means toward employment stabilization. We have learned that each of the following seven points must be taken into account in carrying forward the objectives of the Employment Stabilization Act.

1. Coordination of Federal-State-Local Policies

There is an absolute necessity for close coordination of the public works policies of the Federal, State, and local governments. In the absence of such coordination, it is very difficult to avoid having the efforts of the Federal Government to expand activities frustrated by the curtailment of expenditures by States and cities.

The severe reduction in local government expenditure for public works construction in the period immediately following 1930 was not due to perverseness on the part of municipal government officials. It followed logically from the way local government construction is financed. Local governments are dependent largely upon the yield of the property tax, and in that period of rapidly falling business activity, property values naturally showed a declining trend. Lowered assessments followed in many instances, with a resultant reduction in tax payments, but even where adjustment in assessments lagged, tax rates were subject to the downward pressure of public opinion. It was inevitable, therefore, that municipal revenues should have fallen off rather drastically during the sharp downturn of the business cycle.

Furthermore, a large share of municipal expenditures for public works improvements are financed in the first instance by the issuance of bonds. The principal purchasers of these bonds under ordinary circumstances are trust funds, insurance companies, and savings banks. Consequently, State laws governing the operations of these fiduciary institutions, such as those of New York and Massachusetts, or rather the expressed opinions of bond attorneys interpreting these laws in relation to specific bond issue proposals, are likely to be controlling on marketability. The rigid requirements of these laws in regard to default either on principal or interest tend to make the municipal financing operation a highly conservative one, and it is almost inevitable that if property values and property tax yields decline, the normal market for municipal issues will be reduced. Moreover, public opinion has in general been opposed to municipal borrowing during periods of falling business activity.

All the forces referred to combined during the early 1930's; and to aggravate the situation, there developed a Nation-wide demand for liquidity, with a resultant drying up of credit facilities in general.⁷ It is not

⁷ The Board of Governors of the Investment Bankers Association of America on January 30, 1932, adopted the following resolution:

"Whereas, due to unsettled economic conditions, following a period of tremendous activities, states and municipalities, which were called upon to provide greatly increased services and equipment, are today faced with the difficult problems of carrying on the functions of government and meeting heavy fixed charges in the face of declining revenues and mounting deficits;

"And whereas, it has been proposed that unemployment be relieved by a program of public improvements to be financed through the extension of credit to states and municipalities;

"And whereas, a substantial increase in the indebtedness of states and municipalities at this time would retard the recovery of business and, thereby, the ability of business to increase employment and would be detrimental to the credit stability of such governments and create an added burden on the taxpayers;

"And whereas, it is important to the return of economic stability to maintain the high credit position of states and municipalities, and to decrease the burden of local taxation wherever possible.

"Be it resolved, that the Board of Governors of the Investment Bankers Association of America is opposed to the extension of public improvements which would necessitate an increase in the bonded indebtedness of states and municipalities under present conditions, and that present officials be urged to adopt programs of strict economy, adjust expenditures to actual income, and restrict the incurrence of bonded indebtedness to the end that taxation may be reduced and credit maintained."

surprising that in a period like that of from 1930 to 1935 municipal expenditures for public works were reduced greatly below their pre-depression level.

The provision of financial assistance by the Federal Government for the construction of State and local public works during such periods has an important alleviating effect, but it is not to be concluded that, after the panic stage has been passed, the Federal expenditure will represent entirely a net addition to what such expenditures otherwise would have been. It is impossible to say by just how much local governments' real ability to finance public improvements has been lowered by the depressed conditions of the business community. To an indeterminate degree, Federal grants during the period under review took the place of, rather than added to, expenditures from local revenues. In fact, local public works expenditures from local funds in 1940 were still considerably below the level of such expenditures 10 years earlier. Although the expenditures of the Federal Government for public works purposes are higher, total public works expenditures are not materially more than they were in the pre-depression years.

It is clear that the factors governing local government finances are critical in any national public construction program designed to counterbalance depression forces. Long-range programming of local construction, in conformance with the long-range financial resources of the community, will go far toward smoothing out the curve of local public works activity, and will provide a sound basis of administration for any Federal financial assistance to be made available during periods of depression. But the relations that are to prevail between the Federal Government and the State and local governments during an "emergency" period must be formulated in advance if the necessary coordination of action is to be achieved. If the States and cities are to make their programs properly, they must know ahead of time what sort of aid they are to expect from the Federal Government, whether it is to be grants of a certain proportion of project cost, loans, guaranties of bond issues, or other types of financial assistance. In this field, long-range planning is required by the Federal Government as well as by the States and cities themselves.

2. Continuing Federal Policy

It has also been demonstrated that a series of "emergency" programs of public works construction may be self-defeating in achieving the aim of employment stabilization. Throughout the entire period discussed, there was no definitely continuing policy to guide the planners and administrators of Federal, State, or local governments. Each program was set up as if it were the last. The consequence was a sort of "dead-

line" type of administration, with projects chosen for prosecution in accordance with their degree of readiness and the quickness with which they would put great numbers of men to work, rather than in accordance with the urgency of demand for the improvement being undertaken. When these two criteria worked together, important and socially valuable community improvements resulted; when they conflicted, community value had to take second place.

It is true, of course, that a quick start was highly desirable for the first program; there were millions of unemployed men completely unprovided for at that time. During the ensuing years, however, the number of unemployed was always much greater than could be put to work by the programs appropriated for and the need for quick stopping and restarting was not of fundamental importance. The emergency programs were based on the hope that the unemployment problem would be solved in a brief period, but these hopes, experience proved, were not to be realized.

A continuing policy, established by the Congress, would have made it possible to plan a public works program for a considerable period in advance, projects could have been made ready with the care that important undertakings require, they could have been chosen in accordance with the community values represented by their completion, administration could have functioned smoothly, and the deflationary effects of periodic work curtailment could have been avoided.

3. On-Site and Off-Site Employment

The employment yield of public expenditure for the construction of public improvements is not limited to the jobs on the site of construction. The total employment attributable to a public construction project must take into account also the people employed in the mines and factories producing construction materials, those transporting the materials to the site of the construction operation, and those engaged in managing the work.

The extent to which this off-site employment is developed by any program, of course, depends largely upon the type of projects chosen for prosecution. From project to project, it is extremely variable. Studies have revealed that for the PWA program of non-Federal construction about two man-hours of employment off the site of construction were required for every man-hour of work put in on the construction job itself. On the other hand, the ratio was about one-sixth to one for the work-relief projects included within the program of the WPA.

It has also been shown that employment yield, in man-hours per dollar, is governed principally by the type of work undertaken and the characteristic wage rates paid to the construction workmen, factors that

are likely to be masked in over-all figures for different programs. For example, a recent study indicates that for all the projects included within the PWA's non-Federal program, the cost of each man-hour of employment, including both on-site and off-site labor, was \$1.12, while for the work-relief construction projects carried out by WPA it was \$0.55. If, however, the analysis is confined to a single type of project, such as building construction, the total man-hour cost for the PWA projects was \$1.00 as compared to \$0.73 for those of the WPA. Making a further correction to account for the differences in characteristic wage rates on the two types of project, the cost figures are \$1.00 per man-hour of total employment created on the public works jobs and \$0.90 per man-hour on the work-relief jobs.⁸ This appears to indicate that as far as employment yield is concerned, the type of administration employed is of less importance than the project-composition of the program and the wage rates paid.

4. Self-Liquidating Projects

Any public works program of sufficient size to have marked effect upon a major drop in employment cannot rely wholly upon so-called self-liquidating projects, in the strict interpretation of that term. Our experience of 1932 and 1933 with the R. F. C. public works program provides the evidence. In that program, \$1,500,000,000 was made available for loans to public bodies for the construction of projects that were to be financed wholly out of tolls and service charges; the amount of construction so undertaken was small, and disbursement of the expenditure involved was extremely slow.⁹

There are severe limitations on such a program if the meaning of the term "self-liquidating" is to be confined to that used in the Emergency Relief and Construction Act of 1932. A limited number of projects capable of successful commercial operation on a price basis fall within the customary field of government activity, such as toll bridges, power systems, water works, and sewerage systems, in which the amount of use made of the improvement by any individual is capable of direct measurement. Street and highway improvements, flood protection works, and all those projects directly benefiting property values can be included only if the meaning of the term "self-liquidating" is extended to cover projects that influence revenues derived from special taxes, like gasoline taxes, or from special assessments. Many of the projects for which there is greatest social need could not be included in this category at all.

The number of projects for which service-charge financing will provide an equitable system of allocating

⁸ Galbraith, J. K. and Johnson, O. O., Jr., *The Economic Effects of the Federal Public Works Expenditures, 1933-1938*, National Resources Planning Board, p. 53.

⁹ See p. 15.

costs is still more limited. The benefits derived from the use of many projects most important in community life are extremely widespread, and equity demands that the project cost be borne by the community as a whole rather than by individual users in proportion to the apparent use they might make of the structure. Indeed, the value to the community of many of these projects is dependent upon the extent to which they are used, and any financing method that might curtail this use would be socially detrimental.

In theory, the principal justification for the use of a price base in financing a public service is the economical use of resources brought about thereby. In other words, a price is justified when it prevents waste. For example, a publicly-owned power plant distributing electricity without any schedule of rates, with the entire cost of the service borne by general tax revenues, would without question lead to a highly wasteful use of electric energy. Meters, rate schedules, and special bills for electric service therefore become entirely proper. On the other hand, where there is no close relationship between the price charged for a service and the demand that will be made for it, as in the case of a sanitary sewer system, a price may be quite improper, except on the ground of expediency.

However, many of the projects characteristic of public construction programs are susceptible of partial self-liquidation. Municipal hospitals, for example, may return some revenue, possibly enough to pay the building cost, even though charges to patients could not make the whole hospital operation self-supporting. Housing for low-income groups may continue to need partial subsidy but will produce a certain amount of revenue to be applied against the cost of construction. Wharves, docks, and navigation facilities are capable of a large degree of self-support through service charges and may, in some instances, even be profitable in a commercial sense. Many facilities for recreation also fall into this same class of partially self-liquidating projects. Non-Federal projects built by the Federal Government and leased to State or local governments on terms that fully amortize the construction cost are wholly self-liquidating as far as the Federal Treasury is concerned.

Furthermore, there are types of construction that have not heretofore been characteristic of public activity which could be undertaken during periods of depression and properly financed out of service charges. For instance, the great traffic congestion of our downtown urban areas might be materially relieved and individual convenience served by parking garages which could be self-supporting on the basis of parking fees. Judicious use of the excess condemnation device may secure a return to the public of a part of the benefits to surrounding property growing out of public improvements.

The extension of the scope of public activity during the past decade has also widened the field for many projects that could be wholly self-liquidating. The great power developments on the Tennessee and Columbia rivers, for example, indicate another field of developmental works that can be built within the meaning of the term "self-liquidating."

5. The Elements of Delay

It has been amply demonstrated that many months may elapse between the authorization of a large program of public construction, or even the appropriation therefor, and the actual employment of great numbers of men on construction operations. This delay is occasioned by the time necessary to carry out the preliminary surveys, studies, and investigations, to make the detailed plans and specifications, to arrange for financing (for local governments this may even mean the holding of a special election to approve a proposed bond issue), to acquire land, to advertise for and receive bids and award contracts, and to organize the construction operations. Even after the construction job is completely organized, considerable time may elapse before the employment on the site attains any considerable magnitude.

Although problems of great difficulty must first be solved, it is possible to shorten or telescope some of these time elements. For example, it is entirely possible for land to be acquired in advance of the decision to proceed with construction, even though such advance acquisition requires an outlay of funds that may not be productive of service for considerable time and is, therefore, not likely to be given easy approval by those responsible for public affairs.

The time required for bid advertisement is customarily stated in city charters and ordinances. The purpose of such provisions, of course, is to prevent hasty or concealed action and to give assurance against favoritism. Furthermore, there is a practical need for such time to provide reasonable opportunity for contracting companies to prepare their bids. Force-account construction would eliminate this element of delay if a force-account organization were always promptly available to undertake the work. If such an organization had to be built up, however, the delay involved would probably be even greater than that required to utilize the available facilities of the private building companies.

Expansion of existing force-account organizations to engage in a large volume of easily started work can be accomplished rapidly, however, as experience with the CWA in 1933 showed. Provided that no additional elements of delay are introduced, such as that involved in arranging for joint financing by Federal and local governments or in qualifying each job seeker as to his

eligibility to receive relief, the CWA formula, or something similar to it, provides a convenient way of bridging over the time necessary to prepare for the more solid projects.

Even when a construction contract is awarded, dirt does not begin to fly immediately. Whether the project is built by a private contractor or by a force-account organization, time is required to recruit the construction personnel, to set up construction equipment, and to take the other steps necessary to put the work into full swing. The length of this time interval varies widely from project to project and is governed largely by project size, although it is also affected by the season of year in which the contract is let. The larger the project the longer is the time likely to be between the theoretical starting point and the employment peak. This is probably a natural relationship not susceptible of alteration to any considerable degree. A large project is prone, by its very nature, to require in its first construction steps operations that make limited demands upon construction labor and to require a large working force only after a considerable amount of the preliminary time-consuming work has been completed.

Contracts awarded in the autumn are not likely to reach full operation before the good construction weather arrives in the following spring. The fiscal year of the Federal Government splits the best construction season in half, and appropriations for the public construction programs undertaken during recent years have not ordinarily been passed by the Congress until May or June. If such a program could be made the first order of business upon the convening of Congress, it would be possible to manage the program in closer accord with the natural construction season.

It is entirely possible to reduce to a minimum the delays that so far have been caused by the necessity of carrying our preliminary surveys, studies, and investigations and in making detailed plans and specifications. But here, too, there are some serious problems to be faced. The steps necessary will have to be taken long before the need for an expanded program becomes apparent, and the key to taking these steps is the advance provision of funds for the preliminary planning work.

It is almost universal practice to consider engineering costs as properly chargeable against the project cost itself, and consequently, the engineering work is not ordinarily undertaken until the construction of the project is virtually determined upon. In the case of local government projects, in fact, it is customary for the engineering work to be financed out of the proceeds of the bonds sold for the project's construction, and consequently, the engineering is not undertaken until the project as a whole has been financed.

To provide funds some years in advance for the engineering work involved on public construction

projects presents, of course, the hazard that engineering costs will be incurred on many projects that will never be built. To the extent that this occurs, the procedure would be a wasteful one. However, the hazard is not particularly great if the financing of this preliminary work is properly administered; exercise of sound administrative judgment would reduce to a minimum the loss involved. In any event, the losses that would come about might quite properly be considered the cost of insuring against an emergency. The cost would, without question, be far less than the cost of being caught unprepared.

The situation calls for the advance provision of funds for preliminary studies and for engineering plans and specifications for projects on which no commitment as to construction has been made. One way of making this provision for Federal construction projects is for the Congress to set up by appropriation a revolving fund out of which sums might be made available by administrative allocation to construction agencies for making studies, surveys, investigations, engineering plans, and specifications for proposed projects. It would be understood that the fund would be reimbursed out of any money later made available for the project's construction, but that the advance would represent in no sense a commitment to undertake the construction at any time. Allotments from the fund might most appropriately be made by the President through his Executive Office.

For non-Federal projects, the same procedure might be followed, with advances from the revolving fund to be returned out of construction funds when the project is undertaken.

6. Flexibility and Commitments

The larger the project, we have learned, the greater the difficulty of getting it under way quickly and, conversely, the greater the difficulty of bringing it to a close. Small projects, on the other hand, can ordinarily be started quickly and are, naturally, of short duration. Merely by controlling the number of new projects started, a program made up of many small ones can be reduced or terminated readily without leaving projects half done. A program made up of large projects, like great bridges or big irrigation and power works, is not so easily controlled. Once a large and important public improvement is put under way, there is usually a virtual commitment to carry it through to completion. It is entirely possible, even, that the level of operation on big projects would be in an increasing stage at the time when general policy would demand program curtailment.

A well-balanced program might well consist of a limited number of projects of considerable magnitude to provide weight and solidity, to which would be

added a much greater number of rather small undertakings to provide flexibility.

Flexibility in rate of program progress can be provided to an even greater degree by including in the program the proper proportion of projects of certain types. In general, streets, roads, water distribution systems, sewers, curb-and-gutter work, and the like can almost literally be constructed by the yard and provide utility in proportion to the amount of work done. The operations can be so arranged that whatever is completed when the job is stopped will be of value. Other types of projects like sewage treatment plants, water purification plants, buildings, and so on are not likely to be useful at all until wholly completed.

Rigidity is the reverse of flexibility, and rigidity is one of the principal characteristics of the Federal Government's own construction program. To a large extent, that program is automatically determined for several years in advance by virtual commitments to proceed with large undertakings already under way. In many instances, these commitments are so firm that they cannot be avoided except by the abrogation of existing contracts. Controllability of the construction program is rather completely frustrated, for proper programming implies controllability downward as well as upward. In view of the rigidities introduced by long-term commitments, programming itself loses much of its value.

A similar problem is presented by grants-in-aid to States for highway construction. The amount of work undertaken by the States is virtually determined by the Congressional authorizing legislation, which sets for a two-year period in advance the amount of highway construction for which the Federal Government will bear half the cost. It is not difficult, of course, to expand the amount of highway construction by the enactment of supplemental authorizations, but efforts toward contraction encounter the two-year commitments already made, on the basis of which the States are likely to have let construction contracts.

7. Public Construction Is One of Several Tools

Of paramount importance is the fact that in a major depression it is impossible to rely solely upon the employment created through an expansion of public construction to make up for all of the unemployment created by the decline in business activity. At the lowest point of the great depression, public works employment and business dis-employment were really

of two entirely different magnitudes. Although estimates differ as to the extent of unemployment during the depression period, it was probably in the neighborhood of 13,000,000 in 1933. The estimated combined off-site and on-site employment on construction financed wholly or partially from Federal funds, including work relief, in 1933 was 745,000.

In 1937, unemployment was in the neighborhood of 7,000,000, while employment resulting from Federal activities was 3,500,000. It is clear, therefore, that an important contribution toward stabilization of employment can be made, in fact has been made, by public works, but they cannot do the whole job. It can, however, be reasonably expected that governments see to it that they do not add to prevailing business depression by reduction of their own activities.

Other government activities beyond public works must be considered if the effects of depression are to be mitigated. For example, much of the good done by a public construction program can be undone if the fiscal policies of government are such as to reduce private activity. The compounding of taxes that bear heavily on consumption at times when consumption is low is an example of the type of policy that can have such effects.

In addition to activities in the realm of expenditures and taxes are those that move more directly to the stimulation of private activity. Thus, government has taken the lead in establishing conditions under which the costs of financing by private individuals and institutions are lower. The Federal Housing Administration, through its insurance fund and the use of government credit, has made possible the increase of private investment in residential housing. The Reconstruction Finance Corporation and the Federal Reserve banks, in addition to making direct loans to private enterprise, have also participated in loans made by private banks.

Public measures for insuring some minimum of income for all of our adult population are likewise important in maintaining employment stability. Old-age pensions and unemployment insurance are significant not only because they help those who would otherwise have no income but also because they assist in maintaining the more regular flow of income through the economy and thus are of help to everyone.

Unrestrained monopoly may interfere with full production and restrain employment. Policies of the banking and monetary authorities affect not only the flow of capital but also have their influence on price changes. Thus, in addition to direct financing, there are many governmental activities that should be pursued to stimulate general economic activity.

D. PUBLIC WORKS PLANNING FOR NATIONAL DEVELOPMENT

Public works construction is a means toward an end rather than an end in itself. Great though the process values may be in providing jobs in a period of economic strain, the primary aim of the process must be a product that will contribute to the development of the Nation. Public works projects are not luxuries, mere ornaments to society. They are part and parcel of the physical plant that is demanded by civilization as fundamental and indispensable to its functioning.

Public works construction has always been a major activity of the Federal Government. The first public improvements undertaken by the Congress were lighthouse stations and lighthouses in 1791, which called for an appropriation of \$23,000. Public building construction was begun the following year. The construction of military and naval equipment, of course, is also very old, dating from 1794. But it was not until 1822 that public improvement activity got under way in any great magnitude. It was begun with expenditures for river and harbor improvements and for related flood control. Irrigation projects were not begun until 1903.

In modern society, the need for physical plant goes far beyond anything that would have been imagined in earlier years. Infinitely expanded technical knowledge, a far more closely integrated society featuring great subdivision of labor, a tremendous intensification of productive activity, and a heightened sense of public responsibility for social betterment have been irresistible forces calling for ever-increasing provision of public facilities of wide variety. We have made for ourselves the world's most complete network of transportation routes—waterways, railways, airways, highways, and city streets; we have made the "desert blossom like the rose" through great structures husbanding the waters of semi-arid regions; we have protected our most fertile lands from devastation by flood; we have harnessed the roaring waters to provide power for our factories and our homes; by modern water supply and sewage disposal systems we have virtually eradicated many of the communicable diseases that in an older world periodically decimated city populations; we communicate our thoughts to one another with the speed of light; we, too, have our stadia, our national parks, our playgrounds and other facilities for the recreation of the human spirit. We have made all these things for ourselves. They are interwoven with our modern civilization. They are a measure of our progress from the simpler days of our beginnings. And further progress in the development of our Nation will be

related closely to the further efforts we make in providing for its physical structure and in ministering to its social organization.

Federal and Non-Federal Responsibilities

For a variety of reasons, in some instances wholly logical and in others merely historical, responsibility for building, maintaining, and operating these public facilities is divided among our national, State, and local governments. Although the development of grants-in-aid from Federal Government to States and from States to cities has in many areas brought about a sharing of financial responsibility, cities build the water supply systems, the sewerage systems, and the street systems that serve urban concentrations. They carry responsibility for elementary and secondary education and build the necessary plant therefor. The States build the broad highway networks, the buildings needed for higher education, and those required for the institutional care of the unfortunate. The Federal Government provides the navigation network, much of the land reclamation plant, the flood protection works, the facilities for our national parks, all the requirements for national defense, and many other works of large magnitude charged with a high degree of national interest.

Although the Federal operations are likely to be the most spectacular, in the aggregate the works constructed by local governments represent the largest block of responsibility. In the years preceding the depression, Federal public works accounted for less than one-tenth of all public construction. More recently, the proportion has increased in consequence of the great expansion of the area of Federal public works activity; and the proportion financed by Federal funds has increased even more strikingly as a result of the strenuous national effort to provide work for the unemployed on public improvement construction.

Public construction expenditure by the Federal Government, including grants-in-aid but not loans, as measured by Treasury withdrawals, has been increasing since 1930 both in relative and absolute amount, from about \$275,000,000 in 1930 to about \$2,500,000,000 in 1939. As a proportion of the total Federal expenditure, it has risen from 7 percent in 1930 to 30 percent in 1939. It should be noted, however, that this rise in both the relative and absolute amounts of public construction has been largely due to the use of construction employment as an unemployment relief

measure, although an increased demand for the services and facilities that Federal public works make available has also contributed to this increase.

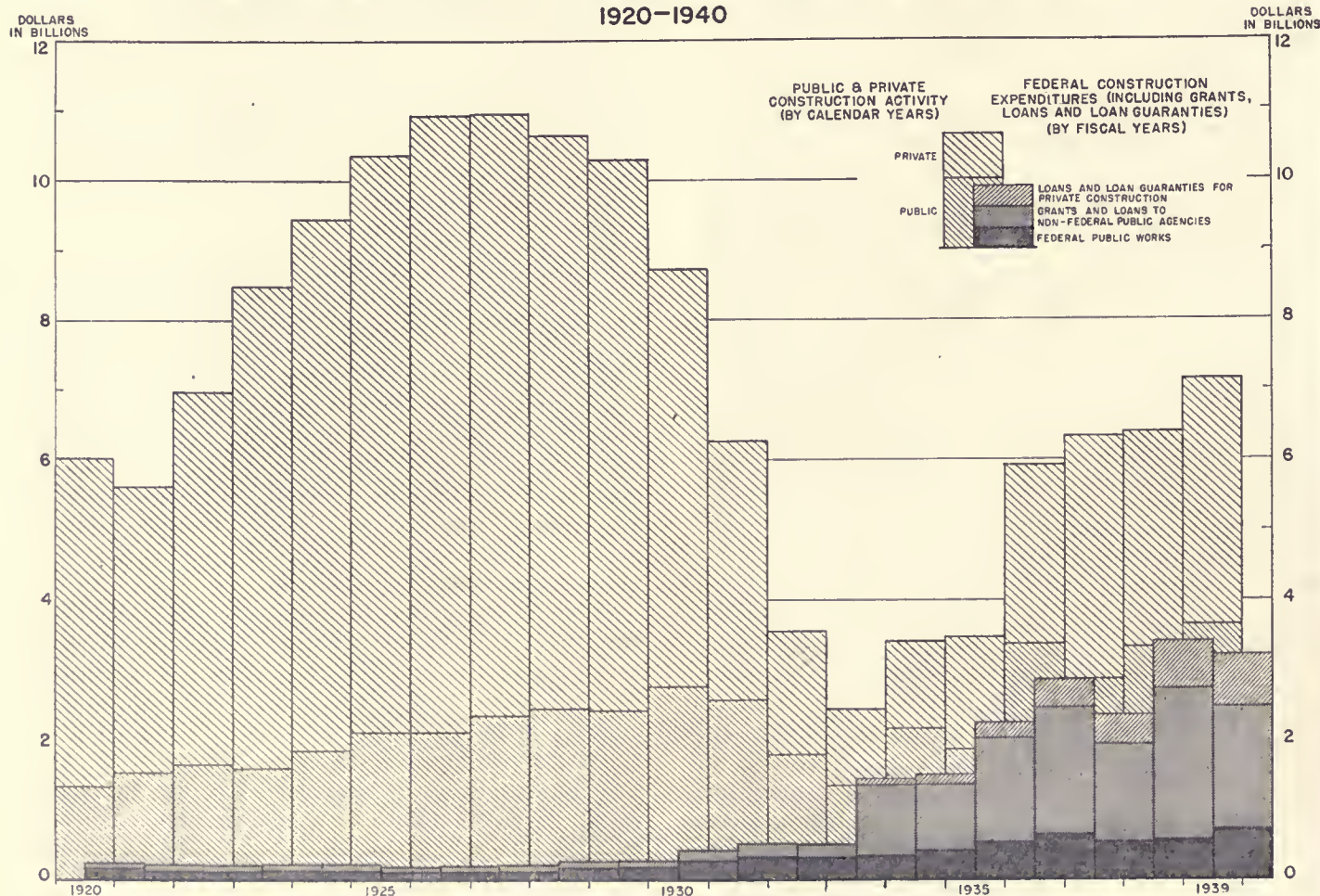
Although direct expenditures, grants, and loans all call for withdrawals from the Federal Treasury in the first instance, on many of the items the Government receives some form of repayment in future years. For instance, expenditures for such works as those built by the Bureau of Reclamation, the Tennessee Valley Authority, and the Bonneville Project provide revenue receipts to the Treasury, in many instances in an amount sufficient to cover the original outlay. Also, the Government-owned corporations like the Inland Waterways Corporation and the Panama Railroad are business enterprises that pay for their operations out of their receipts. Loans to public or private agencies are all repayable, and while the repayments may not in all cases be direct receipts of the Treasury,

still, if they are made to Government-owned corporations, they do represent a realization on assets in which the Government has a proprietary interest. Guaranties made by the Government are eventually liquidated by the repayment of the loans underwritten. Only the grants-in-aid and the direct expenditures for the construction of facilities that produce no revenue are to be regarded as non-recoverable budgetary drains.

Federal Participation in Total Construction Activity

In comparing the operations of government in the construction field with the construction operations of private corporations, many close similarities are disclosed. Ordinarily, the same type of workmen are employed, the same type of materials and equipment are utilized, and management problems are not greatly

ESTIMATED VOLUME OF NEW CONSTRUCTION ACTIVITY IN THE UNITED STATES,
AND FEDERAL EXPENDITURES AND GUARANTIES FOR NEW CONSTRUCTION
1920-1940



different. Public construction, therefore, is ordinarily considered a component part of the construction industry.

The influence of public-works activity upon the total volume of construction in the country from that point of view becomes a highly pertinent consideration. As a builder and as a building financier, the United States Government has directly influenced construction activity in four different ways. These have been, (1) expenditures made by regular Government departments or by Government corporations for the Federal account, (2) grants-in-aid to State and local governments, (3) loans to non-Federal public agencies, and (4) loans to private agencies and guaranties of private loans.

From 1920 to 1932, the amount of construction affected by Federal Government participation, either direct Federal construction or Federal financial assistance, was a relatively small part of the total, particularly during the first half of that period, when it averaged between 2 and 2.5 percent. After 1927, it became an increasing proportion, rising from about 2 percent in 1927 to about 20 percent in 1932, largely because of the rapid falling off of private construction and local public works. During all that time, however, Federal participation was confined to direct expenditures for the Federal Government's own works and grants-in-aid to States for highway construction.

Following 1932, several important changes occurred in the type of these expenditures. Grant-in-aid expenditures were increased in amount and were applied to a wider variety of types of construction, while construction loans (or guaranties of construction loans) were made available to public and private agencies. Consequently, from 1933 through 1935, the Federal Government participated in one manner or another in a much larger proportion of the total construction activity of the country. Beginning with 1936, the extent of this participation, while increasing in absolute amount, has become, by reason of the revival of private building, a somewhat smaller proportion of the total volume of construction activity. It is important to note, however, that a large volume of private construction is now financed by Federal loans or facilitated by Federal loan guaranties, a condition that did not prevail during the earlier period. The total Federal participation of all kinds in recent years has amounted to more than \$3,000,000,000 or about 40 percent of the total construction volume.

Construction Undertaken by the Federal Government

From 1921 to 1932, the bulk of Federal construction expenditure was made for roads, river and harbor improvements (including some flood control work), public

buildings, and irrigation works. Beginning in 1932, these expenditures were extended to include—by means of grants or loans—practically all types of public and private construction.

In considering the purposes for which Federal construction expenditures have been made, the expenditures have been divided, by our technical advisers, for purposes of convenience in this report, into six major categories for this discussion:

1. *Water use and control*—Including flood control, irrigation, hydroelectric plant and transmission systems, public water supply systems, and public sewerage systems;

2. *Public land development*—including parks and forests, wildlife conservation, and soil erosion control;

3. *Transportation*—including roads, river and harbor improvements, aids and assistance to navigation, airports and airways, railroads, canals, and various structures such as wharves, docks, bridges, etc.;

4. *Defense*—including Army and Navy flying fields, military and naval posts, supply depots, and navy yards;

5. *Government plant*—including administrative buildings, post offices, research facilities, hospitals, prisons, educational buildings;

6. *Housing*.

Trends in Construction by Federal Agencies

Following the readjustment of Federal expenditures after the World War, the Federal Government's direct expenditure for its own works became fairly well stabilized in the neighborhood of \$125,000,000 annually, where it remained up to 1929. During that period, the largest single item of expenditure was for the development of rivers and harbors. In 1929, however, the first step-up in rate of expenditure occurred as a consequence of the public buildings program initiated at that time. A four-fold increase in this category occurred in 1929, which, together with smaller increases in practically all other categories, carried the expenditure as a whole for that year to about \$187,000,000. The public buildings program carried through to 1933, when it reached its maximum of \$118,000,000. Between 1929 and 1933, the other categories of public works showed no marked increases, except for a rise in reclamation (reflecting the construction of Boulder Dam), in flood control, and for a short period in 1931 and 1932, in the construction expenditures of the Quartermaster Corps. Largely as a result of the public buildings program, the 1932 total was in the neighborhood of \$334,000,000.

The next significant date is 1933, when the PWA was established in an effort to expand public construction to take care of the unemployed. That year also

saw the creation of the TVA. The public buildings program of 1929 had by 1934 tapered off to about \$80,000,000.

In carrying out its function of raising the level of public works construction throughout the country, the PWA made a number of allocations of emergency funds to various Federal departments to allow them to expand their construction activities. The category most immediately affected was that of river and harbor development, which rose by \$30,000,000 in the program's first year. The undertaking of the Bonneville and Fort Peck projects also contributed strongly to the peak of \$152,000,000 reached in this category in 1936. The TVA expenditure was rather modest during the first year of its life but within 2 years reached a fairly well stabilized level of about \$35,000,000 annually. Expenditures for the purpose of land development rose considerably through the expansion of the work of the Forest Service and the National Park Service and the inauguration of soil erosion control activities. Peak expenditure in this category also

occurred in 1936, when it reached a \$62,000,000 level. The public works programs begun in 1933 also brought about a further sharp rise in expenditure for reclamation, occasioned principally by the undertaking of construction on several projects of great size, including the Grand Coulee project. Flood control increased slowly but steadily over the same period.

The net effect of these forces was to carry expenditures for Federal public works to a high of about \$510,000,000 in 1937.

In the following year, expenditures as a whole declined to \$480,000,000. Analysis indicates, however, that the decline was brought about almost wholly by a reduction in expenditures for river and harbor development, for during that year expenditures for public buildings, for land development, for the TVA, and for most other categories remained fairly constant. Indeed, expenditures for reclamation and flood control even increased their rates of expansion, with flood control expenditures going up in consequence of the 1936 Flood Control Act and its 1937 amendment.

EXPENDITURES FOR CONSTRUCTION OF FEDERAL PUBLIC WORKS CLASSIFIED ACCORDING TO FUNCTION, FISCAL YEARS 1921-1941

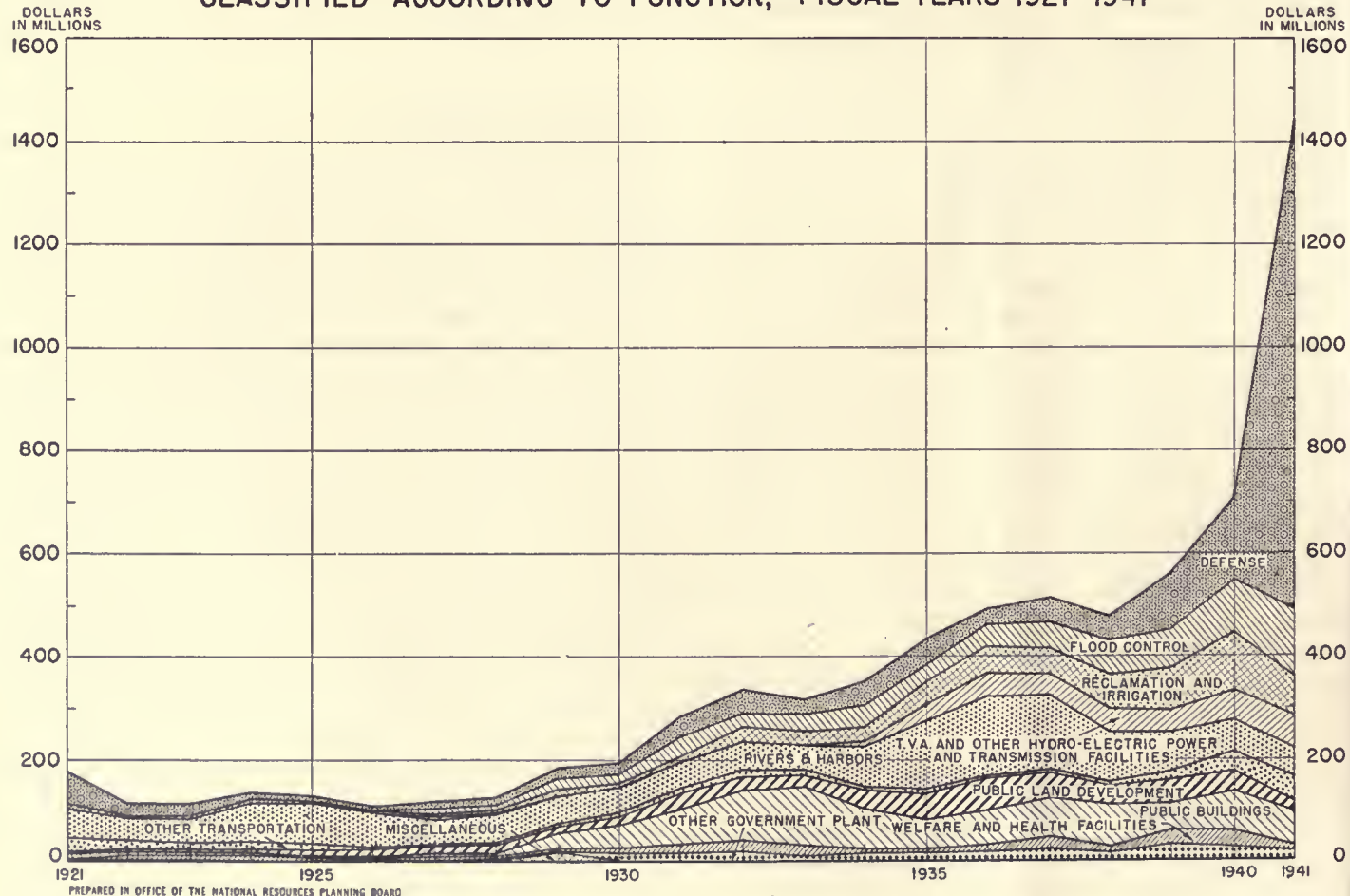


Chart 7

This 1938 decline in construction expenditure was very short-lived; in 1939, the total rose again to \$564,000,000 and to \$658,000,000 in 1940. To be sure, a very large proportion of this later rise was due to expansion in construction designed to bolster national defense; the increase in this category alone was \$100,000,000. However, the steady rise in expenditures for reclamation and for flood control was also a strong contributing factor. (The Flood Control Act of 1936 was further amended in 1938 in such a way as to call for increased Federal expenditure.)

In the fiscal year ending June 30, 1940, when the total Federal construction was \$658,000,000, the distribution over five general categories was as follows:

	Percent
Water use and control (including flood control, reclamation and TVA).....	38
Public land development.....	6
Transportation (including rivers and harbors).....	14
National defense.....	23
Government plant (including public buildings).....	19

During the past 8 years, water use and control has received a steadily increasing proportion of the total, from about 19 percent in 1933 to 38 percent in 1940. Expenditures for land development have been a fairly constant proportion of the total, rising from 6 percent in 1933 to 12 percent in 1936 and dropping back to 6 percent in 1940. The proportion going for transportation expenditures shows a rise and subsequent decline similar to that shown for land development, from 20 percent in 1933 to 32 percent in 1936 and back to 14 percent in 1940. The proportion for national defense remained fairly constant, at about 8 percent, from 1933 to 1937 and then rose to 23 percent in 1940. Expenditures for public buildings and other Government plant received a sharply declining proportion of the total during the early portion of this eight-year period, declining from 47 percent in 1933 to 20 percent in 1935, and have remained at about that proportion ever since.

The general trend of expenditure during recent years, therefore, has been a rise in both relative and absolute amounts for water use and control and for national defense, a relative and absolute decline in transportation, and approximate stability in expenditures for land development and general facilities. Within the water use and control category, TVA expenditures have become approximately stabilized, while expenditures for flood control and reclamation have been steadily rising in both absolute and relative terms. Within the category of transportation, river and harbor expenditures have been declining steadily since 1936.

Estimates of expenditures for the fiscal year 1941, however, show that an entirely new movement has been initiated. The increased emphasis on national defense

will bring about during the current year a three-fold increase in construction expenditures for the Bureau of Yards and Docks and a nine-fold increase in the expenditures of the Quartermaster Corps. In addition, expenditures in several categories of what are normally considered civil public works will be greatly increased because of the contributions that the new facilities will make to the national defense purpose.

Although total expenditures for Federal construction will show a rise from \$659,000,000 to an estimated \$1,533,000,000, that rise is largely accounted for by the rise of \$746,000,000 in the expenditures for the Bureau of Yards and Docks and the Quartermaster Corps. Exclusive of defense items, Federal public works expenditures will remain approximately the same. This will be in the face of an increase of TVA expenditures over the next year from \$39,000,000 to \$60,000,000, an increase in the expenditures for the Panama Canal of from \$18,000,000 to \$32,000,000, and a tripling of expenditures for physical facilities for research, principally the building up of the facilities of the National Advisory Committee for Aeronautics, all of which are to be undertaken with a national defense purpose.

Flood control will continue its rapid rise, from \$105,000,000 in 1940 to about \$114,000,000 in 1941. On the other hand, reclamation and land development expenditures will probably show a decline. Expenditures for rivers and harbors and for public buildings will continue their downward trend.

Trends in Construction by Federal Corporations

The Farm Security Administration, the Panama Railroad Co., and the Inland Waterways Corporation are three Federal corporations making expenditures in the construction field. Also, certain expenditures made by the PWA Housing Division before November 1937, when the projects were taken over by the United States Housing Authority, may be included in this category. (These expenditures are for housing projects owned by the Government but leased to local authorities.) In relation to the expenditures in the other categories already discussed, the expenditures of these corporate agencies are minor in amount, but an accounting for them is necessary to complete the picture of construction activities for which the Federal Government is responsible.

Obviously, the construction for which these agencies are responsible is confined to three categories: (1) land development and (2) housing by the Farm Security Administration and the United States Housing Authority and (3) transportation by the Panama Railroad Co. and the Inland Waterways Corporation. The two transportation companies, of course, were the only

Federal operating corporations in existence prior to 1934, and consequently before that year, all of the expenditures in this general class were for transportation. From 1930 until 1935, these transportation expenditures declined steadily, down to \$31,000 annually, but began to increase again in 1936 and attained a level of more than \$10,000,000 in 1939, which is several times the amount expended by those two agencies a decade earlier.

The Farm Security Administration came into being in 1934. Its land utilization projects account for expenditures in practically only 2 years, 1936 and 1937, but its rural rehabilitation housing projects have continued through to the present time. The year 1937, when it spent nearly \$50,000,000 for each of those two purposes, saw the high point of this agency's expenditures.

Since the close of 1937, only transportation and housing are represented in the category of corporation expenditure; the former has shown an upward trend during the past few years, while the latter has been declining sharply.

Federal Grants-In-Aid for Public Construction

Until 1933, grants-in-aid by the Federal Government for public construction were confined entirely to grants made to States for highway work. For 6 or 8 years previously, the annual amount distributed in the form of grants was stabilized at about \$85,000,000, dropping to about \$78,000,000 in 1930. In 1931, however, road grants were doubled, and the higher level prevailed for the next few years, reaching \$166,000,000 in 1933.

Grants-in-aid were increased much further by the establishment of the 1933 public works program. Not only were State highway grants increased again, but the PWA and the CWA were organized on a grant-in-aid basis, the latter to be succeeded during the following year by the WPA. In consequence of the functioning of these new agencies, the amount distributed in grants rose to an entirely new level in 1934, to about \$882,000,000. Of this amount, \$224,000,000 was distributed by the Bureau of Public Roads and the remainder by the PWA and the new work-relief agencies.

In addition to the establishment of new grant-making agencies, new categories of construction were made eligible for grants. Although more than half of the amount so distributed in 1934 was still for roads and city streets, local government construction of flood control facilities, public water supply systems, sewerage facilities, public buildings, hospitals, schools, electrical utilities, and others received grants for the first time.

Since that year, the total amount of grants has fluctuated from year to year with the alternate expansion and curtailment of various "emergency" programs, but on

the whole, the trend has been strongly upward. The total has increased from about \$882,000,000 in 1934 to about \$1,919,000,000 in 1939, decreasing to about \$1,308,000,000 in 1940. Although the grants made by the PWA have been of great importance in certain categories, such as public water supply systems and educational buildings, the amount granted for construction carried out under work-relief auspices has been the dominant factor in the total.

From the 1933 figure of \$166,000,000, grants for roads and street construction increased steadily to more than \$1,000,000,000 in 1939, then decreased to slightly less than \$700,000,000 in 1940. Educational buildings, recreation facilities, and sewerage systems have been three additional categories of considerable importance, amounting to \$181,000,000, \$167,000,000, and \$136,000,000, respectively, in 1939.

The distribution of the total over the categories employed in this report has been fairly constant ever since 1934. Grants for transportation works have consistently claimed more than half of the total grant program. General facilities, including public buildings, educational buildings, and recreational facilities, have received about 30 percent of the total. Construction falling within the category of water use and control, including water supply and sewerage systems, has been fairly well stabilized at about 12 percent of the total. The small remainder has gone for construction designed to further national defense, particularly armory buildings, and for land development activities.

Federal Loans for Public Works Construction

The practice of lending money to local governments for public construction was not begun by the Federal Government until the Reconstruction Finance Corporation was established in 1932. Its activities in lending money for "self-liquidating" projects occasioned the distribution of about \$29,000,000 in 1933. The establishment of the Public Works Administration in that year, however, at a time when the private market for municipal bonds had dried up, caused the amount of funds lent to increase greatly in 1934 and the years following, although it never approached the amount distributed in the form of grants. The 1936 figure was about \$199,000,000. The running out of the first PWA program in 1935, its re-establishment in 1936, and its curtailment in 1937 and 1938 brought about wide fluctuations in the amount of loans extended to States and local governments. On the other hand, the establishment of the United States Housing Authority in 1937 brought the total amount so distributed to a new high of \$438,000,000 in 1940.

From 1933 through 1936, the lion's share, from 40 to 50 percent, of these loans went for public water supply

systems, hydro-electric generation and transmission, reclamation and other construction for water use and control. After 1936, when the private market for municipal securities had been re-established, the amount lent for this category of construction declined steadily until, in 1939, it represented little more than 5 percent, the principal part of which was for water supply systems. Similarly, loans for transportation facilities bulk large in the first years of the loan program, from 15 to 50 percent of the total, and have declined steadily from 1936 to represent but 9 percent in 1940.

Educational buildings received the next largest share of loans when the PWA was first established, but the amount lent for this purpose has dropped since 1935, when it amounted to 21 percent of the total, to only 3 percent in 1940.

On the other hand, public housing received practically nothing in the form of loans prior to 1938. In that year, the amount lent by the United States Housing Authority represented a little less than 3 percent of all Federal loans for public construction, but it increased its share rapidly to about 45 percent in 1940. Similarly, the amount lent for construction of electric utility plant was relatively small before the establishment of the Rural Electrification Administration in 1935, but because of the activities of that agency, the amount so lent expanded greatly in 1938, when it represented slightly more than 40 percent of the total in that year, and declined again in 1940 to account for about 24 percent.

The changing nature of the various loan programs has been the dominant factor in determining the distribution of loan funds over these various categories.

EXPENDITURES FOR FEDERAL GRANTS FOR NON-FEDERAL PUBLIC CONSTRUCTION
CLASSIFIED ACCORDING TO FUNCTION,
FISCAL YEARS 1921-1940

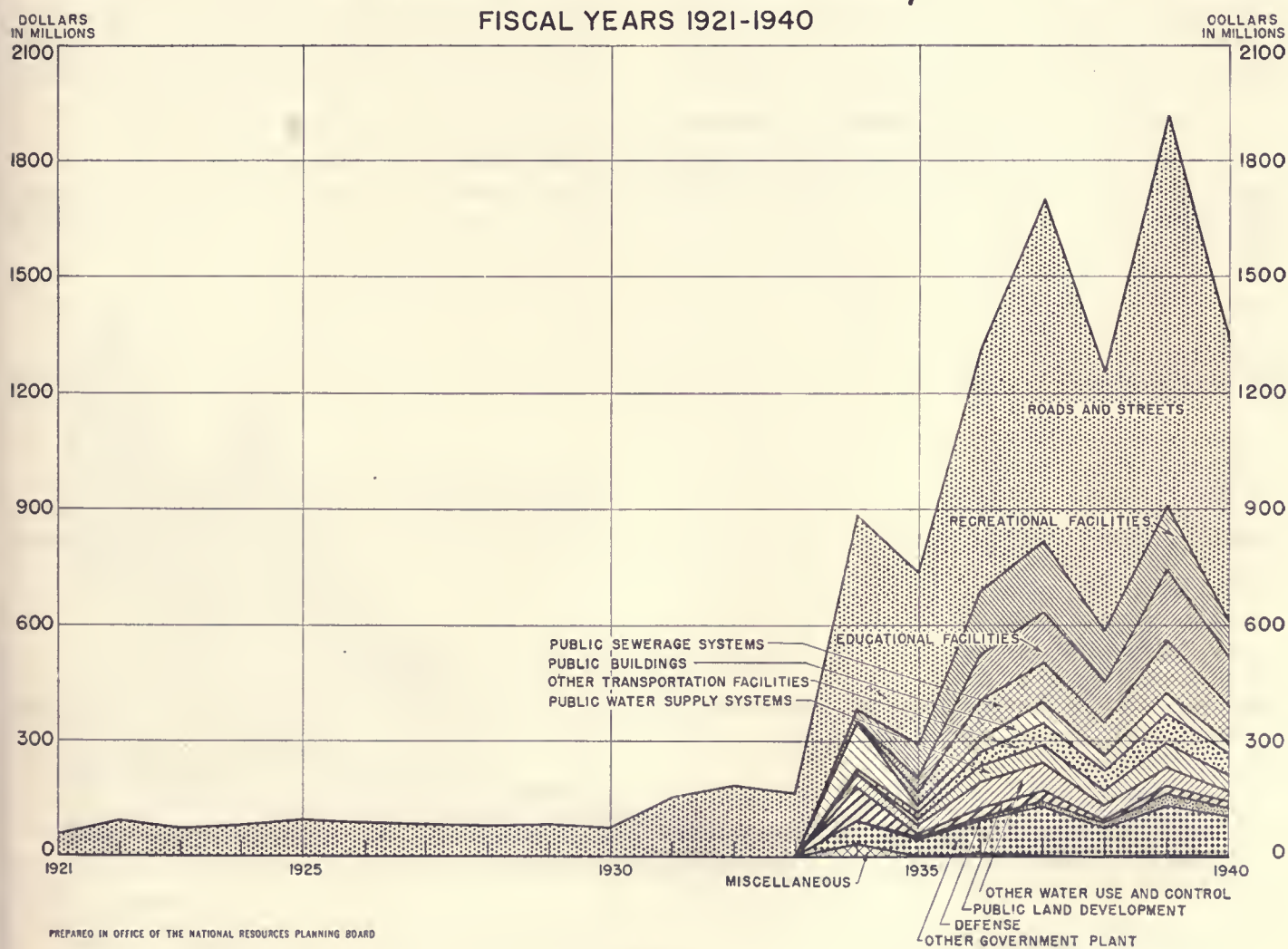


Chart 8

When the loan program was first introduced, the bulk of it went for construction in the field of water use and control and transportation. More recently, however, public housing and electric plant facilities have come to be dominant.

Federal Loans for Private Construction

The Reconstruction Finance Corporation and the Federal Housing Administration have been the principal agencies engaged in making loans to private agencies for construction (considering the loan-guaranty arrangements of the Federal Housing Administration as equivalent to loans for purposes of this study). As in the case of loans for local governments' public works, loans for private construction have fluctuated widely during the past 7 years as a result of shifts in emphasis on the work of the various lending agencies.

The year 1934 was the first year in which these loans for private construction totaled any considerable amount, when a total of \$83,000,000 was reached, \$75,000,000 of which represented PWA loans to railroads. In 1935, the total amount rose to \$136,000,000,

most of which was again for railroad loans. From 1936 onward, the picture has been strongly dominated by the FHA guaranties of loans for private housing. The amount of guaranties so extended has climbed steadily from something less than \$200,000,000 in 1936 to more than \$700,000,000 in 1940.

Clearly, the trend for this class of Federal activity is sharply upward, due to the expansion of the activities of the Federal Housing Administration.

Total Federal Participation in Construction

When direct expenditures, grants, loans, and guaranties are taken into consideration, the total volume of expenditure represented shows almost a twenty-fold increase since the pre-depression period. Prior to 1930, only direct expenditures, grants-in-aid for State highways, and the small expenditures of two Federal corporations were involved, and the total amount was rather well stabilized at a little more than \$200,000,000 annually. In 1929 and 1930, the volume was somewhat raised by an increase in direct Federal expenditures and grants to about \$275,000,000. The increases became more rapid in 1931, 1932, and 1933, principally through

FEDERAL EXPENDITURES, GRANTS, LOANS AND GUARANTIES OF LOANS
FOR CONSTRUCTION CLASSIFIED ACCORDING TO FUNCTION,
FISCAL YEARS 1921 - 1940

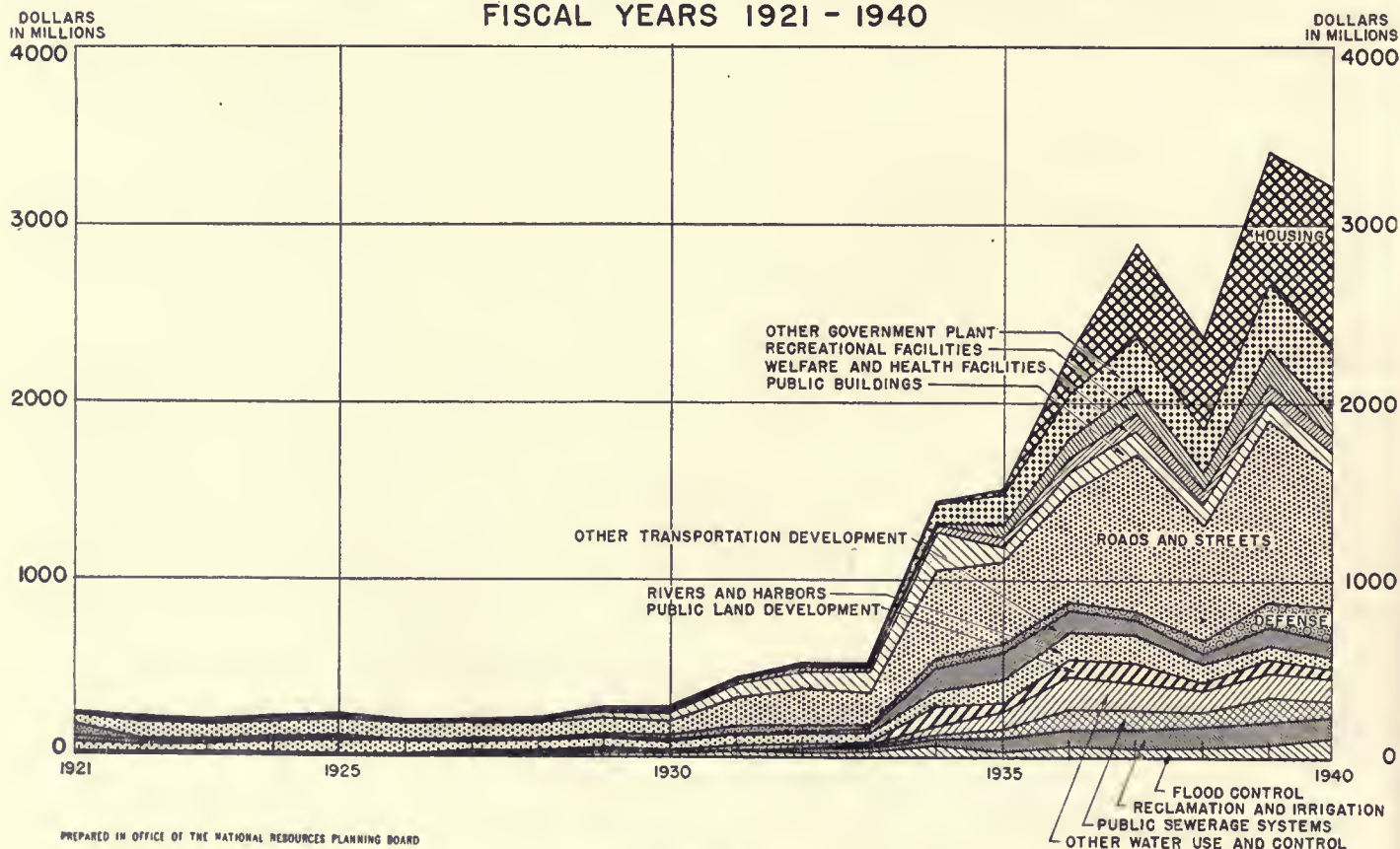


Chart 9

the doubling of State highway grants and a decided rise in direct expenditures for reclamation, irrigation, and public buildings.

The establishment of new agencies in 1933 caused a three-fold rise in the total for the following year, with the greatest increase being brought about by the extension of the grant-in-aid principle to the field of local public works and the inauguration of work-relief activities in the field of construction. Since that year, the course of total expenditures and guaranties has had a strong upward trend, to a total of \$3,400,000,000 in 1939. At the present time, the field is strongly dominated by grants-in-aid rather than by direct expenditures; with the principal element in this dominance being the work-relief activities of the WPA. Grants represent approximately half of the total of construction expenditures for which the Federal Government may be considered responsible. The second strongest item is the loan-guaranty activities of the Federal Housing Administration.

In 1939 and 1940, the average distribution of the total amount over these various types of expenditures was as follows: direct expenditures 19 percent, grants 49 percent, public loans 10 percent, private loans and guaranties 21 percent, corporation expenditures less than one percent.

When this total of the Federal Government's participation in the construction industry is analyzed by functional categories, it is found that the field of transportation was by far the largest item until 1936. Since that time, it has been declining relative to the total, although the absolute amount has still been rising, to more than \$1,200,000,000 in 1939. Starting from scratch in 1934, financing of housing construction has increased rapidly until, in 1940, it attained a volume of more than \$900,000,000, nearly equal to that attained by transportation. Other construction within the field of government plant, including public buildings, educational buildings, recreation facilities, and publicly owned electric utilities, is the next largest category at present, totaling about \$738,000,000 in 1939. Expenditures for water use and control, including flood control, reclamation, public water and sewerage systems, and the TVA, became the next strongest item in that year, accounting for a little less than \$500,000,000. Construction undertaken for the purpose of national defense, of course, has expanded rapidly during recent years, to about \$185,000,000 in 1940. Construction for the purpose of furthering land development amounted to about \$64,000,000 in 1939.

Significance of the Past 10 Years

The past decade has clearly been an extremely significant period for public works. Principally because

of the Nation's efforts to utilize its public construction activities as a means toward employment stabilization, there have been important changes in the amount of activity undertaken in this field, in the scope of the field itself, in the relations of the Federal Government to it, and in the methods by which the activity is administered and carried on.

Taking into account all governmental expenditure for construction, there has been no sharp increase in the total, but there has been a marked shift toward Federal financing. Local governments' activity still dominates the field as it has always done, but Federal financing, through grants and loans, now accounts for a very much larger share of the total than it ever did before. This financial participation has naturally brought about an entirely new situation in regard to the relations between the Federal Government and the cities, a relationship that was practically non-existent before 1930. To a considerable degree, municipal activity in the public works field has become dependent upon and even governed by Federal Government action. Only the future can tell us whether or not these new relationships are to remain permanent aspects of our governmental institutions.

Entirely new activities have been undertaken, and the distribution of emphasis among activities of long standing has been altered. Governmental construction of housing facilities has become an established area of public activity. The construction of publicly owned power facilities has been developed considerably beyond the place it occupied a decade ago. Improvements in transportation facilities still represent a most important category, but within that category, the development of air transport has occasioned a marked growth in the construction of airports and airway facilities.

A most important development has been the tremendous growth of the area of work relief. Of the total number of workmen engaged in public construction, a major proportion is now accounted for by those who have been employed because they badly needed jobs to do, rather than because the job to be done needed them. This is an extremely significant change, for it reverses entirely the operating principles prevalent a decade ago. Out of that change have come related changes in the manner of doing work, such as the change from a maximization of labor-saving machinery to achieve greatest economy in construction operations to a maximization of the use of unskilled labor, and in the criteria of project selection, from placing major emphasis upon urgency of community demand to major emphasis upon a project's suitability for operation under work-relief auspices.

The distribution of expenditures among the various purposes for which public improvements are con-

structed, however, is still not determined with the object of achieving a properly planned balance, except insofar as the distribution achieved expresses a balance of the immediate demands for various types of work. How does the Nation's real need for additional transportation facilities compare with its real need for additional flood protection? How is the need for more irrigation to be compared with the need for more housing? How can a proper balance between these

various functions be obtained? It is clear that the techniques for determining the needs must first be perfected and that the methods of making such comparisons must be worked out. Only on the basis of such determinations can a long-term public works program be properly formulated. Only in that way can we be confident that we shall be using our resources to the best advantage in the protection and development of the national estate.

E. REGIONAL AND FUNCTIONAL DEVELOPMENT POLICIES

1. PROGRAMMING OF PUBLIC WORKS

The programming of public works consists of an appraisal of specific projects to determine (1) whether or not public funds should be provided for them and (2) the order in which desirable projects should be undertaken.

First, the general objective of public works must be kept in mind. Does the project aid man to derive from all available resources the maximum benefit and satisfaction consistent with the permanent maintenance of our primary resource base? Does it increase economic welfare, promote employment stabilization, and improve the utilization of resources?

Evaluation of Costs and Benefits

No public work can be considered acceptable unless the total benefits, social and financial, to whomsoever they may accrue, exceed the total costs. Furthermore, since there may be more works that meet this criterion than available funds will finance, there must be a selection of projects with the most favorable ratio of benefits to cost.

The difficulty here lies in the measurement of benefits that can neither be sold nor definitely traced to specific individuals or to limited areas. Many social benefits cannot readily be expressed in dollars and cents. For example, the recreational value of forests, parks, or reservoirs is very real, but thus far has defied attempts at measurement. The benefits of soil conservation activities in limited areas have been measured in terms of the present dollar value of increased productivity or the arresting of declining productivity, yet from a broader point of view, the soil resources of the Nation are priceless. Many water development projects may not entirely pay for themselves, but permanent social benefits accrue from the creation of jobs or establishing a lasting resource base for those now earning a precarious livelihood. The public expense involved, often, is no greater than the direct relief that would otherwise be necessary. The retirement of submarginal lands makes possible basic land-use adjustments, contributes to a reduction in relief and other governmental costs, and increases the stability of the area as a whole, although the lands so purchased may never pay for themselves in a commercial sense.

One clue to the value of such benefits lies in the reaction of those who would ultimately have to pay the costs. If a community is willing to repay all the costs of a project, it indicates that the people of the com-

munity consider the benefits at least equal to the costs, even though the benefits are social, and not vendible. However, as the area affected widens, the possibility of obtaining such public judgment narrows. To some extent, the employment benefits from public construction that offset relief expenditures, for example, can be reduced in part to quantitative terms. The public expenditures saved by such public construction must be added to the positive benefits they create.

In multiple-purpose projects, the development of comparable measures of costs and benefits will make a significant contribution to the validity of the evaluation process. While the total dollars and cents costs of a specific project may be estimated with reasonable accuracy, the problem of apportioning costs of multiple-purpose projects is still exceedingly difficult. Until a commonly acceptable method for determining costs and benefits is developed and adopted, there is no objective basis for comparing the costs and benefits of each separable function.

Financing Public Works

The evaluation of costs and benefits is designed to indicate whether a project is worthy of being undertaken, regardless of who pays the bill. There arises the further question of the allocation of costs among beneficiaries: "Who should pay the bill?"¹ Thus, a project which provided for private, and for local, State, and Federal Government participation in the ultimate costs might be preferable to a similar project which offered little promise of local participation.

In addition to the technical difficulties of measuring intangible benefits and joint costs, the allocation of costs also involves questions of general economic policy, fiscal policy, broad governmental policy, administrative feasibility, and so on. It may, for instance, be quite feasible to estimate the benefits of some project and to trace these benefits to a particular area or group; yet broad economic policy may suggest that there are also general benefits which should be charged to the public at large. In other cases, ability to pay may be the guiding criterion, since many maladjustments are beyond the ability of individuals or groups to correct, yet corrective programs must go forward in the interest of the people and the Nation.

The important consideration is not that there should be a rigid formula for uniformly allocating the costs of

¹ For discussion of division of costs and responsibilities, see *Public Works Planning*, National Resources Committee, 1936, pp. 139-211.

all types of projects. Rather, it is that a consistent general policy should be observed by all agencies advancing capital or making expenditures for similar types of projects.

From the Federal point of view, the important decision that must be made within a consistent policy, is: "How great is the general public interest, and what proportion of the total cost should the Federal Government pay?" In periods of relatively high employment, the persons receiving directly traceable benefits in the form of increased income or services ordinarily should pay the cost of such benefits; the Federal Government should assume only the cost of those benefits which are very widely distributed, which contribute to an important national policy, or are part of a recognized Federal responsibility or function. In periods or areas of heavy unemployment, however, the Federal Government may properly assume such additional portions of the cost as may reasonably be assigned to the relief of unemployment and the stimulation of the economic system.

The ultimate responsibility for bearing costs must at this point be distinguished from the original advance of funds. The Federal Government may well perform the "banking function" of initially financing the total cost of projects for which it expects in the long run to be completely reimbursed in the ordinary business sense. It may stimulate employment, investment, and economic activity through activities of this sort without ultimately absorbing any of the cost. Self-liquidation (in its commonly accepted sense of full return from vendible benefits) should not, however, be a major consideration in comparing the desirability of public works. There are many projects that are not self-liquidating in this narrow sense, but that are never-

theless desirable; they may not be "self-liquidating" simply because the benefits are not vendible. The question of who advances the capital, and the rate at which it is repaid, is secondary. The responsibility for ultimate absorption of costs, however, is a primary consideration, and proposed arrangements for financing should, accordingly, accompany all proposals for public works activities.

Functional Policies and Regional Planning

The appraisal of specific proposals for public works activities becomes hopelessly confused if not made within a framework of both functional policies and regional plans: functional policies, such as those for land use, water use, transportation, power, etc.; regional plans, in which all of these considerations are related to a particular region. The benefits of specific projects cannot finally be judged except with reference to a logical plan for orderly development of an area or of a function. The apparent benefits of an individual project are closely related to the extent to which it can be coordinated with a more general group of undertakings, in the same area and in other parts of the country.

Fitting individual projects into a logical and orderly plan or program, area by area, requires (a) that appraisal of projects be carried on in close consultation with all agencies involved; and (b) that there be machinery in which local, State, and regional groups can aid in developing functional plans, public works proposals, and general economic plans for those areas, and that State and local support be provided for such regional and functional planning.

2. REGIONAL DEVELOPMENT PLANS

Well considered programs for national development must, of course, reflect local, State, and regional points of view as well as the best judgment of administrative groups and functional policies. In Part II of this report, we reproduce statements on Regional Development Plans prepared in the field, in cooperation with regional and State planning agencies and with representative citizens.

What is a region? Americans have always recognized the existence of regions or groups of States within the United States which have distinctive problems or unifying backgrounds. From the earliest Colonial days of the New England Confederation, through the time when the "South" was clearly recognized, down to the more recent realization of great geographic areas like the Dust Bowl, or the Tennessee Valley, we have thought in terms of regions. In 1935, the National Resources Committee issued a report on "Regional

Factors in National Planning and Development" which reviewed the many types of regions and regional organization in this country. Since that time, many further efforts have been made to organize regionally or on a sub-national basis for both public and private purposes.

The desire of the National Resources Planning Board and its predecessors to aid decentralized planning has contributed a number of experiments in this field. The Board has organized its field staff in regional centers serving areas with no fixed boundaries and using a variety of different planning methods adapted to the special situations in each area. For strictly administrative and budgetary reasons, the number of "centers" which the Board could staff was limited to 10 located as follows:

1. Boston, Mass., serving New England.
2. Baltimore, Md., serving the Middle Atlantic Region.

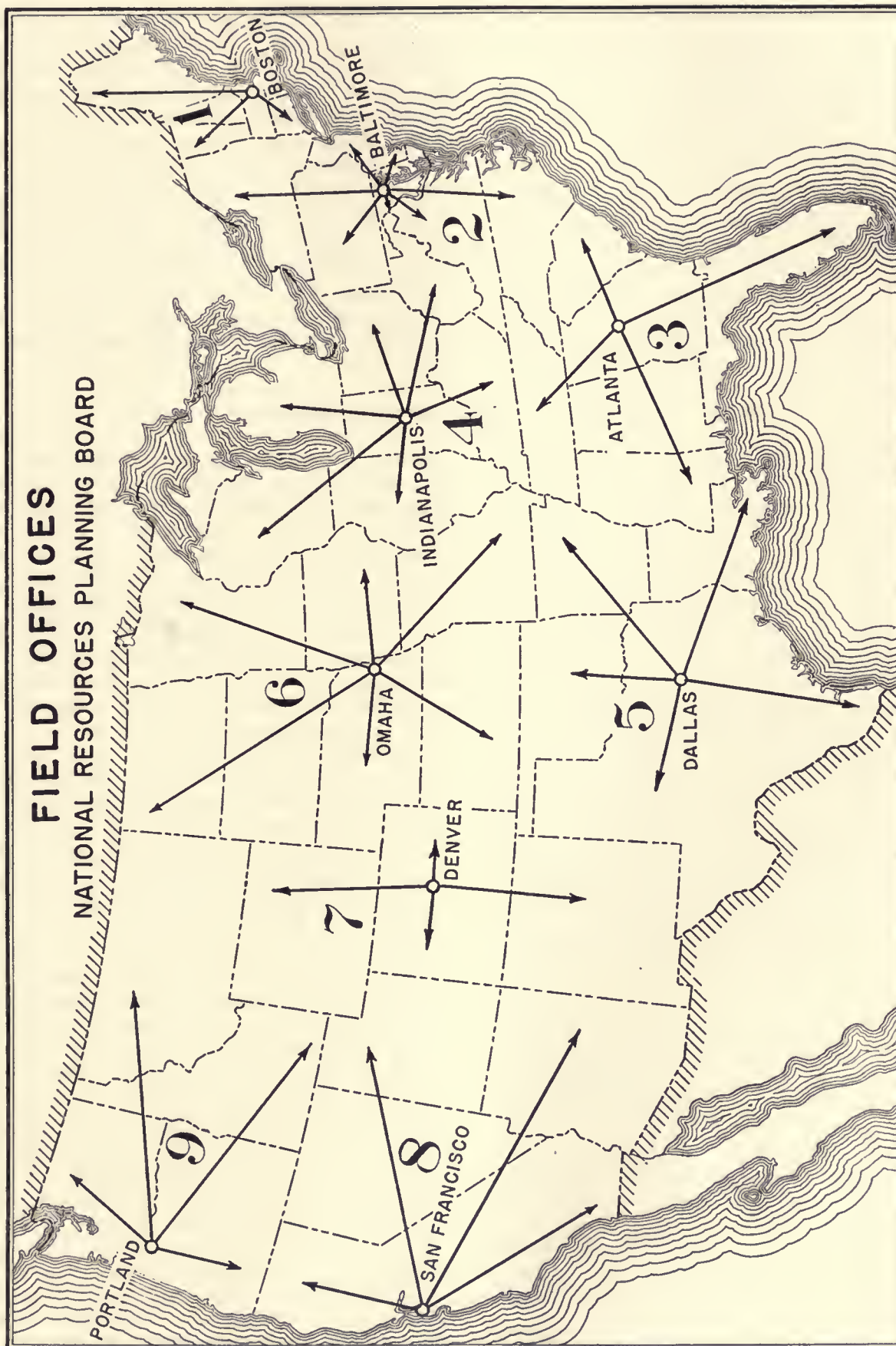


Chart 10

PREPARED IN OFFICE OF THE NATIONAL RESOURCES PLANNING BOARD

3. Atlanta, Ga., serving the Southeastern Region.
4. Indianapolis, Ind., serving the Ohio-Great Lakes Region.
5. Dallas, Tex., serving the South Central Region.
6. Omaha, Nebr., serving the Missouri Valley.
7. Denver, Colo., serving the Intermountain-Great Plains area.
8. San Francisco, Calif., serving the Southwest.
9. Portland, Oreg., serving the Pacific Northwest.
10. Juneau, Alaska, serving Alaska.

From each of these Field Offices or regional centers, the Board has received preliminary statements of the objectives of regional developments as seen by the regional officers of the Board. These programs have been revised, re-worked, and expanded during the last year with the cooperation of State planning boards, regional planning commissions, special advisory groups, and with the active assistance of the field representa-

tives of many Federal agencies. The resulting statements, reproduced in Part II of this report in the form submitted from the Field, are called "Regional Development Plans." They are obviously first approximations of plans rather than full specifications.

The criteria or statements of objectives which these Regional Plans suggest for testing public works projects vary as might be expected in accordance with the widely different problems which the regions face. It is hoped that these first statements and the revisions and improvements in these Regional Plans, which are already under way, may aid in the public understanding of regional points of view towards development projects and aid the Congress in making decisions concerning them.

3. FUNCTIONAL DEVELOPMENT POLICIES

The following summaries drawn from statements on land, water, energy, and transportation policies provide a general background for the weighing of public works projects in relation to functional policies. These are the results of studies by the Board's technical committees and staff. More extended statements on land, water, and energy constitute Part III of this report.

(a) Land-Use Objectives and Public Works

The central aim of a national land-use policy should be "to enable man to derive from the land the maximum benefit and satisfaction consistent with the permanent maintenance of that resource."¹ All public works that directly or indirectly affect land use should contribute to the achievement of this objective. Moreover, all public works in this field should harmonize with the far-reaching Federal, State, and local programs, in fields other than public works, that now encourage desirable physical, economic, social, and institutional adjustments essential to permanent land use.

From the standpoint of land use, a public works program has three principal aspects: (1) the general economic aspect of the public works program as a whole, (2) the aspect of public works which affect land use indirectly, and (3) the aspect of public works which are primarily land-use adjustment measures.

General influence of public works on land use.—Since a soundly conceived public works program is an essential part of public activities and expenditures designed to stimulate a high level of employment and production, the general effect of public works has an indirect but vital relationship to land use, for the ultimate success of both public and private land-use activities is

inextricably bound up with the success of the economy as a whole. The top limit of employment, benefit, and satisfaction of the people on the land is largely prescribed by the condition of the entire economy. All aids to the economy in general open possibilities in the land-use field, just as ill-considered activity in the entire economy threatens possibilities in the land-use field.

Public works closely related to the land-use field.—There are many types of public works not always considered to be in the land-use field that have a significant effect upon land use. Flood control, public roads, or power development may be planned primarily for their self-evident purposes, yet each project may have beneficial or harmful effects on the land. A flood control reservoir, for example, may inundate occupied farm land, or a rural highway may encourage settlement on inferior lands, while good lands remain inaccessible. The planning of public works in this category should therefore look not only to the primary objectives but also to the possible repercussions on land use.

Public works in the land-use field.—Finally, there is a group of activities, such as soil conservation, forest protection and development, provision of recreational facilities, and irrigation, which are recognized as important parts of a general land-use program. These activities must either be considered as public works or as similar to public works in relation to resource development and employment stabilization. Plans and programs in these fields of endeavor should therefore be evaluated primarily as integral parts of the Federal, State, and local programs for land-use conservation, development, and adjustment, broadly construed.

Before attempting to suggest the outlines of a six-year program of public works affecting land use, some understanding of general economic trends and their specific relation to land-use adjustment is necessary.

¹ *Public Land Acquisition, Part I—Rural Lands*. National Resources Planning Board Report, June, 1940, p. 1.

The land-use pattern of the United States was developed largely by trial and error. In most local areas, land use has changed many times. As new lands opened to the westward and their products flowed eastward, as Federal land policies changed, as new crops found their place in the scheme of production, and as technological developments revolutionized methods of production, the character of land use changed and changed again. A New England town began with self-sufficient farming, shifted to cash-wheat production, then to hay and horses, and finally to dairying. A Georgia county began with self-sufficiency, changed to cotton, then to dairying, back to cotton, then to peanuts, and finally back to the beginning—self-sufficiency. A Colorado county, opened under the Homestead Act, tried cash grain until the dry years came, then half the population fled as dust storms raged, and now the remaining farmers are turning to grass and livestock.

In the course of this development, the land-use adjustments were made by individuals, without public aid. Some of these adjustments were painfully achieved, because of the lack of public aids, and they were not accomplished until persistent distress "starved out" those who would not change. But the majority could either turn to new uses for their land, and find a profit in the steadily expanding markets for food, fiber, and timber, or migrate to new land and new opportunity.

Within the last generation, however, have come three great changes that marked the end of the exploitive period: (1) The United States became a creditor nation; (2) the physical frontier was closed; and (3) the urban population trend changed.

The collective impact of these changes on agricultural economy was hardly understood in the period during which they occurred, and even today few people are prepared to accept its full implications. For now the United States as a whole faces the task of changing its use of the land—nationally, regionally, locally—just as many local areas changed their land-use patterns time and again in the past. The individual today cannot make the changes alone, for adjustments must take place in all parts of the country concurrently. Public action, the lack of which permitted so much misery and maladjustment in the past, must take the lead in the readjustments of the future.

As a result of the effects of our change from a debtor to a creditor nation, the closing of the frontier, and the changes in population trends, many public aids were initiated. We tried to shift lands out of soil-depleting surplus crops, and into soil-conserving crops. Loans were made to supplement deficient farm incomes and promote better farm management. CCC enrollees carried on reforestation and soil conservation work. Arid lands were irrigated. Price-sustaining loans, ever-normal granary storage, crop insurance, and the pur-

chase of submarginal lands were instituted, all in an effort to stabilize incomes, improve the patterns of resource use, improve tenure for those on the land—in short, to build toward a reasonably permanent and socially desirable system of land use. Some complementary State aids, such as zoning, better management of tax-reverted lands, and the creation of soil conservation districts, also came into play, with varying degrees of effectiveness.

Specifically, what were the effects of the three major changes in the conditions surrounding agricultural production?

(1) *The Nation's change to creditor status.*—Up to the beginning of the World War, the United States was a debtor nation. In order to pay off capital and interest on European investments in this country, we exported more than we imported. After the World War, Europe owed us huge sums—sums she was unable to repay in gold and was not allowed to repay in goods. Our new creditor status meant that our exports were limited by how much we would import in exchange, or how much we would lend abroad; and since we raised our tariff walls and curtailed credits, surpluses of farm commodities accumulated.

After the war, the foreign market kept on shrinking. European nations, spurred by memories of short rations in wartime, were doing everything possible to increase their own farm production. Simultaneously, newly settled countries like Australia and Argentina made a bid for a larger share of the dwindling world market. Meanwhile, our own farm production had continued to expand under the impetus of technical advancement and the cultivation of new land. Our surpluses continued to grow, demoralizing the price structure, swelling the ranks of the unemployed, and forcing our farmers to exploit their resources at an accelerated rate.

(2) *The physical frontier.*—Historically, the frontier to the West has been our national safety valve. The family whose land played out could always move West. When wages were low or employment was scarce, the city workman and the agricultural laborer alike could follow the sun across the Alleghenies, across the Mississippi, across the Great Plains, or across the Rockies to new opportunity. The closing of the frontier brought the realization that there were no new land areas to exploit.

(3) *The change in population trends.*—The rapid advance of agricultural technology created a complementary decrease in the number of people necessary to operate the Nation's farms. This was no problem as long as the growth of industry provided city employment for the surplus farm population. But recently the doors of industry have been closed to laborers from country and city alike. The loss of foreign trade has reduced the markets for farm products; advances in

technology have further reduced the labor needed in agriculture; yet the closing of the frontier and the drastic shrinkage in urban employment give the surplus agricultural laborer no place to go, except as expansion of our national economy makes a place for him.

Rural unemployment has not affected all areas and regions with equal severity. Geographic shifts in comparative advantage for crop production, resulting from changes in technology, transportation costs, market demand, and soil depletion have distributed rural unemployment and poverty very unevenly. In some areas it is chronic and would persist even in the face of general national prosperity.

Nor is all rural unemployment of the same type or intensity. Many wage hands are totally unemployed; others are dependent upon seasonal or part-time jobs; and many farm operators carry on types of farming that provide them with only part-time work, which they supplement with off-the-farm labor for cash wages. This is especially true in single-crop areas, such as the cotton or the hard spring wheat territory. In such regions, the rational remedy, diversification, is not always feasible, either because of natural conditions or lack of capital. The plight of the part-time laborer and the wholly unemployed, with no resources of their own, is still more serious. Part-time and full-time unemployment among rural people represents one of the greatest wastes of the American economy. If this unused labor can be tapped, it can increase enormously our productive capacity.

The current war is likely to have a further depressing effect on agriculture. The general indications, regardless of the war's outcome, point toward a more restricted foreign market for American farm products. Certain products for home consumption will benefit from defense preparations, but areas in which export crops are grown will not benefit appreciably. In the years immediately ahead, additional land-use difficulties will tend to concentrate in these areas. Unfortunately, there is no way of anticipating with absolute assurance the land-use adjustments that will be required as a result of the world changes now under way.

However, defense expenditures and related activities are apt to give at least a temporary lift to the whole economy which may result in a temporary lessening of rural population pressure. Even a temporary period of increased industrial employment may provide the opportunity for making some basic readjustments in the land-use field.

Lines of Action for the Next 6 Years

It seems clear that the relationships of land use to the rest of the economy are such that any evaluation of public works in the land-use field must not only

be integrated with other public and private efforts designed to facilitate (1) shifts in types of land use and related shifts of population; (2) the rebuilding and development of land resources by utilizing the increasing supply of rural labor; (3) the provision of facilities necessary to health, welfare, and good land use; but also with (4) the development of labor-absorbing capacity in industrial activities. Certainly in connection with all of these, public works must play a significant part.

The total volume of public works over the next 6 years is likely to be large owing to a rapid rise in public works that contribute to national defense. However, the needs of defense must not lead to a disregard of basic conservation and development activities. Because there is a distinct possibility that curtailment of defense expenditures would, in the absence of public works, result in heavy unemployment, it will be most urgent to carry on research and investigations to permit sound preparation for employment absorption after the slackening of defense activity. For the next 6 years, it will be necessary to have in readiness programs which will make readjustments in the post-defense period least difficult.

What are some of the readjustments likely to become pressing in the post-defense period?

Shifts in land use.—Shifting lands to uses more appropriate in light of the economic outlook by such public activities as land acquisition, irrigation, drainage, forest development, and range conservation is a process that should not be allowed to lapse during the defense emergency. Indeed, haste is necessary if maladjustments are not to result in disaster: public works that facilitate necessary shifts in land use should be emphasized throughout the six-year period ahead.

Public works affecting land use must not serve to freeze existing undesirable situations. It should be the aim to recognize basic trends and adjust to them, rather than to postpone inevitable changes by ill-considered public activities. A public works program should be a dynamic means of correcting maladjustments, capable of modification as social objectives change.

Rural conservation work.—In spite of the increase in employment that is apt to accompany the period of rapid defense preparations in the United States, many rural areas will continue to be burdened by considerable unemployment. A sound program for public works which affects land use must therefore give employment to rural labor and, at the same time, yield permanent values in conservation and development of resources, especially since the areas in which population, poverty, and unemployment are most concentrated are also the areas in which the natural resources have taken the most punishment, and are most in need of protection and rehabilitation. Public works on rural

lands offer good possibilities both for absorbing unemployment and for rebuilding human and physical resources, and should be capable of rapid expansion when defense expenditures slacken.

Land settlement.—Several types of public works help achieve employment stability, either by developing new areas, or by making existing areas suitable for more intense settlement. Irrigation, water facilities, some phases of flood control, drainage, land clearing, and other activities which bring good land into productive use at a reasonable cost should be encouraged. But the development of good lands should be accompanied by the retirement of submarginal lands, or a reduction in the intensity of their use; and new production, moreover, should be directed into lines where surpluses are least burdensome.

In areas where new land is now available for settlement, an orderly program of land classification, development, and settlement should be initiated immediately. In areas where existing settlers can be made productive and self-supporting, the relevant public works should move full speed ahead. In areas where public works for land development and settlement are already under way, additional public works which follow as a logical sequence should be given favorable consideration. In all such areas, a major need is sound land classification. Without it, there is real danger of maintaining or encouraging production in areas submarginal for farming with all its well-known consequences.

Land purchase and development.—Public acquisition of the land is a basic tool for facilitating many types of adjustment. Through public acquisition and resale or lease of potentially good agricultural land, the government can guide settlement on new lands in such a manner as to avoid new maladjustments and to keep the benefits of public works from falling into the hands of speculators. Public acquisition of submarginal lands is necessary to permit the rebuilding of the soil to the point where it can again support population; to help change the system of farming in maladjusted areas; to round out the land phase of watershed protection; to reduce the costs of public services; and to play vital roles in other situations, as detailed in the National Resources Planning Board report on land acquisition.

Forestry.—A third of the land of the United States is forest land, much of which is idle, wasting. The development of the Nation's forests, public and private, is necessary in the long-run, and desirable immediately as employment for rural people. Forest development activities have not only a general flexibility, which makes them significant in rapid adaptation to employment needs, but they also develop a vital resource.

Soil conservation.—Despite all that has been done, the soil resources of the United States are still on the downgrade; the rate of loss has been reduced, but serious loss

continues. The first objective is to stop this serious loss. While much of the essential control work must be done by private individuals, it is clear that public agencies must also do a great deal on both public and private lands.

Range improvement.—Vast acreages of western range lands, on which a large part of the livestock industry depends, are seriously depleted. This is true of Federal, State, and privately owned lands. All types of works, such as water spreading structures, stock water tanks, and contour furrowing, designed to check erosion and improve the forage, are necessary and desirable. They may be quickly started, and quickly stopped, providing useful employment for skilled and unskilled workers.

Recreation.—Recreational areas, such as the national parks, should, of course, be included in public works programming. Useful work can be provided during the development period, and the recreational areas are a priceless asset to the Nation.

Public facilities.—Among the public works affecting land use, both urban and rural, those that provide the usual public facilities (such as roads, schools, hospitals, sewage disposal works, parks, housing, and public buildings) play a significant part. They are all subject to effective timing if properly planned, although the maintenance costs are somewhat inflexible. The provision of such facilities can be invaluable in timing for employment stabilization. Road construction, especially, should be consistent with general land-use plans, for the spectacle of building and maintaining new roads in declining areas is all too common. Housing, rural electrification, and health facilities cannot be emphasized too strongly in the period ahead. All of these activities are adaptable to rapid changes in scheduling public works expenditures, and sound projects in these categories may well bulk large in a reservoir of public works over the next 6 years.

Development of industrial activities.—In the last analysis, and in spite of everything that can be done to facilitate adjustment to basic trends and to increase the use-capacity of land resources, employment opportunities for many of the people now on the land must still be found in industrial and service activities. In addition to their general effect on the national income, therefore, public works should also aid in the development of new industrial activities in both rural and in urban areas.

(b) National Water Policy

The Federal Government accepted the responsibility for improving the waterways for navigation purposes more than a hundred years ago. At the beginning of this century, the Government undertook the reclamation of public lands through irrigation and more recently,

the duty of controlling power development on streams subject to Federal jurisdiction and of providing protection against floods. Measures to accomplish these purposes in general have been taken separately and have been directed primarily toward a single end. The interrelationships between water and other resources, between different types of water development, and between the various projects within the same or different drainage basins were not fully recognized until comparatively recent years.

Full utilization of our water resources requires that water be related to other resources; that in any program for water development and control, all of the potential uses be given careful consideration; that individual projects be weighed in relation to other projects in the same drainage basin and to conditions in other basins as well; and that each individual project provide—initially or ultimately—for as many uses as are feasible. It is now realized that development of water resources through unrelated projects built for single purposes, and separately operated, is generally wasteful, destroys potential values, and threatens future utility.

This principle of coordinated development of multiple-purpose projects is being recognized, both in legislation and in administration, as essential to the realization of maximum social benefits at minimum cost from the use of our water resources. Multiple-purpose projects of great magnitude are in operation or under construction in many States and more are under immediate consideration. The problem is now primarily one of establishing a unified national water policy through which this principle may be translated into effective action, including policies for financing, operating, and managing these great public projects.

A National Water Policy

Such a national water policy will provide for the preparation of plans for the unified regulation and development of the river systems in the country, based on thorough surveys and investigations of the physical, economic, and social factors involved in such regulation and development. These plans will deal with the control and best use of water resources for all of the possible beneficial purposes in effective combination, including:

- (1) Navigation;
- (2) Flood control;
- (3) Protection against droughts;
- (4) Irrigation;
- (5) Development of hydroelectric power;
- (6) Drainage;
- (7) Water-flow retardation;
- (8) Reduction of erosion and siltation;
- (9) Abatement of pollution;

- (10) Provision of water supplies for domestic and industrial use;
- (11) Enhancement of recreational opportunities; and
- (12) Conservation of fish and wildlife.

The national water policy will also provide for the programming of construction on the individual projects in the order of their urgency—the actual work to be undertaken as rapidly as is economically and socially justifiable, with due allowance for the necessity of speeding up construction in periods of unemployment and in the interests of the national defense. The policy should insure that social, general, and potential benefits are taken into account in considering specific projects, as well as economic, special, and immediate benefits. The responsibility of the Federal Government for the development of a national water policy was emphasized in the recent decision of the United States Supreme Court in the so-called “New River Case.” The Court stated that “* * * navigable waters are subject to national planning and control in the broad regulation of commerce granted the Federal Government.”

The Federal Government under a national water policy should assist in the settlement of controversies between or among States over interstate waters; encourage the States to adopt regulations to curb the wasteful use of water resources; provide for systematic and effective cooperation among Federal agencies, and between Federal agencies and the various agencies in the several States, in formulating water plans and programs; and eliminate inconsistencies and conflicts in existing laws and regulations that govern the action of Federal agencies as they pertain to the control or utilization of water resources.

Present Procedures

Progress has been made in recent years towards establishment of legislative and administrative provisions to make possible (1) the efficient budgeting, authorizing, carrying out, and reporting of surveys and investigations of interrelated water problems; (2) coordinated planning, designing, construction, and day-by-day operation of multiple-purpose projects for the fullest practicable utilization of river systems; (3) the proper division of the costs of projects of national significance among Federal, State, and local political units and the various groups of private beneficiaries, and on multiple-purpose projects, the proper allocation of costs among the several functions; (4) an orderly sequence in the undertaking of projects; and (5) the effective timing of construction to relieve unemployment during periods of business depression. Further steps are needed to secure these objectives.

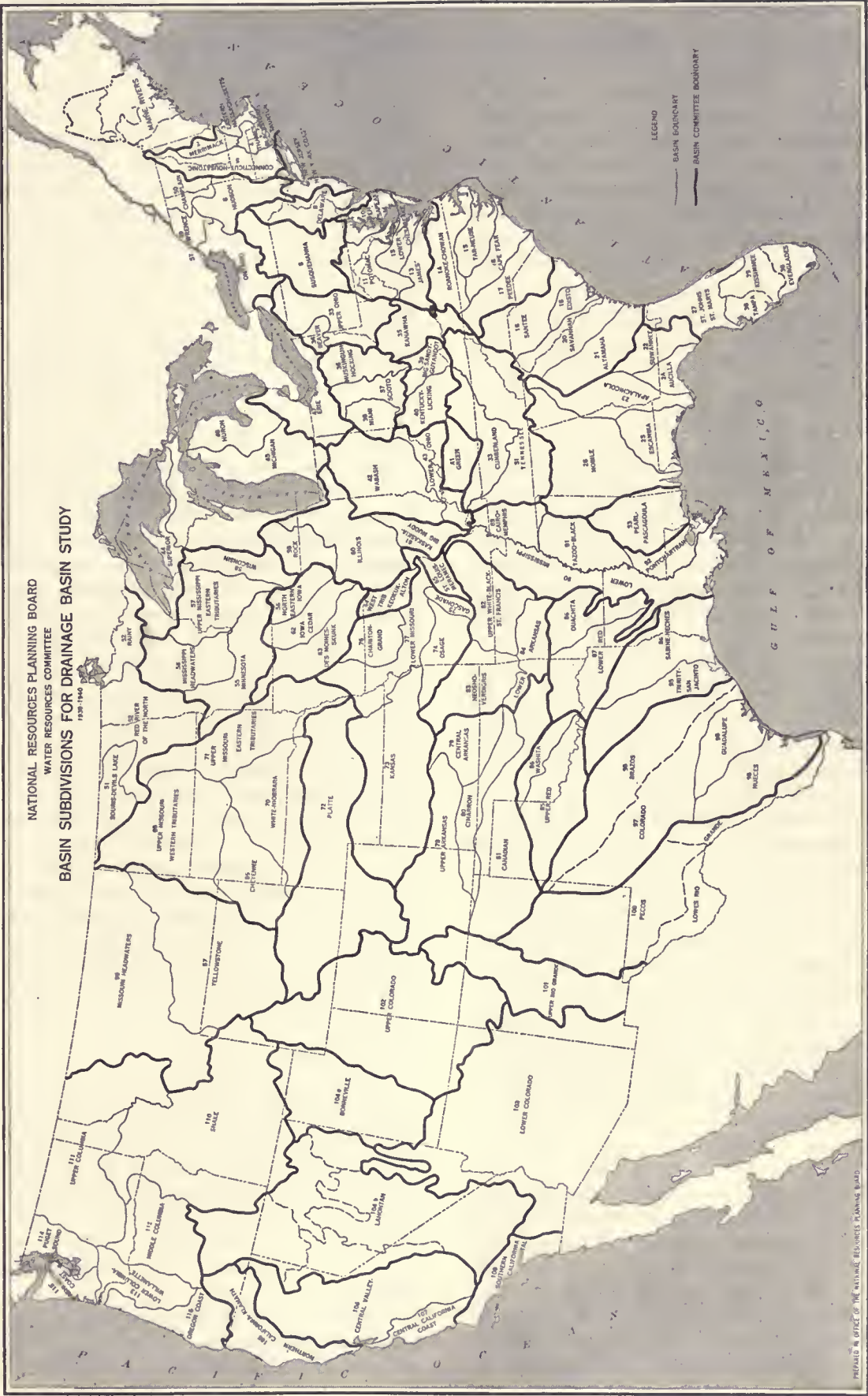


Chart 11

Multiple-Purpose Development

In order to make possible the economic and efficient development of our water resources under a unified national water policy, individual projects included in the plans for the development of a drainage basin should be designed to serve as many purposes as are feasible, regardless of the primary reason for the construction of each project. Many projects, originating in a single need, afford practicable opportunities for combinations that would multiply benefits and, in most instances, reduce the cost of each of them below what it would be if the benefits were sought singly.

Every project should be carefully planned in relation to other projects within the basin and to conditions in other basins, and also in relation to possible future as well as present development.

Immediate Need for an Operating Policy

In earlier days, the operation of a public water project related chiefly, if not wholly, to a single purpose such as the maintenance of a navigation channel or the storage, release, and distribution of water for irrigation. Though some of these projects were large, they were relatively simple in that they involved only one or a few main structures—in many instances, only a single channel or reservoir.

Today, the Federal Government is already concerned with the multiple-purpose operation of huge works already constructed in the Tennessee Valley, on the Columbia River, and on the lower Colorado River. Many other multiple-purpose projects are under construction, and in the future additional systems of interrelated structures may be expected.

Federal participation in the unified operation of each group of developments should be commensurate with the national investment involved, the national interest in the purposes served, and the national responsibility for the success of the enterprise. State and local interests should also participate, since they are immediately affected, since State laws must be taken into account, and since the State power to tax must be exercised if local beneficiaries are to share directly in the costs. Moreover, local cooperation and support is closely linked with local popular control over the distribution of vendible services.

Financing

Wherever there is a sufficient national interest, either in the furtherance of some national policy such as rural electrification or navigation, because of the project itself, or by reason of the stimulating effects of the work on employment and on business, the Federal Government should stand ready to underwrite or advance the capital necessary for the construction of sound development projects. Federal participation is necessary in

many projects because they affect interstate commerce and because most of the major drainage basins are interstate or international. The benefits that accrue to the Nation as a whole from wise use of its water resources make it appropriate for the Federal Government to supply this banking service as its normal minimum contribution. Joint participation in the advance of capital should be encouraged, however, particularly where local contributions can be made in kind—by providing land or rights-of-way, for example—and where provision has been made for local participation in the administration of the project after completion.

The final actual costs, as distinguished from capital advances, should be repaid as far as possible by the beneficiaries of the projects, with due consideration for the amount of benefits received by each group. The Federal contributions to the ultimate cost should be proportionate to the national benefits derived, including economic stabilization and unemployment relief. Insofar as possible, private and local beneficiaries should be assessed their fair share of the costs of non-vendible benefits, including, for example, the indirect benefits of irrigation to persons other than water users. This will require State action supplementing the tax policies of the Federal Government. Repayment contracts should contain provision for adjustment and some flexibility to allow for fluctuations in the incomes of beneficiaries arising from causes beyond their control, as in the Reclamation Project Act of 1939.

Navigation facilities have heretofore been provided free, but consideration should be given to the desirability of charging tolls for the use of waterway improvements. Where vendible benefits pass through the hands of one or more intermediaries before reaching the ultimate consumer, provision should be made against absorption by middlemen of an undue share of these benefits. Avoidance of speculation in power is no less desirable than avoidance of speculation in land, provision against which was made by statute in connection with the Grand Coulee project.

Costs and Benefits

It is necessary to estimate both the benefits and the costs of a proposed project in order to determine whether it should be constructed. Neither the benefits nor the costs are capable of precise determination, if due weight is given to intangible and indirect effects; and yet some estimate must be made as a basis for decision. In addition, fair and rational allocation of the costs for ultimate repayment requires consideration of all the benefits.

For each major project or group of projects, a comprehensive and explicit evaluation should therefore be made of all benefits and of all costs before construction,

reasonable approximations being used where exact measurement is impossible. Such evaluations should be based on total returns, both tangible and intangible, potential and immediate, indirect as well as direct, that may be anticipated from a project by all beneficiaries, both public and private. To arrive at total costs is perhaps less difficult, but some consistent methods for evaluating in dollar terms the intangible and indirect costs—as well as benefits—of a project should be devised. Allowance for interest should be included in the cost estimates where projects are financed with borrowed funds, regardless of the policy with respect to ultimate repayments of project costs, and this interest should be comparable to the amount the Government must pay on borrowed funds. Amortization over a period not longer than the estimated life of the project should be provided for.

Regulation

In order to encourage better State regulation of water use, Federal contributions to flood control projects might well be made contingent upon the States enacting and enforcing legislation prohibiting further undesirable encroachment upon stream channels. The building of structures that raise the flow line or increase the duration of floods has aggravated an already serious flood hazard in many valleys. Flood plains should be zoned to prevent unnecessary risk and damage. Similarly, Federal expenditures for irrigation projects should be made conditional upon reasonable assurance that the irrigated acreage will not be extended beyond the limits of reliable water supply. This could be enforced through such measures as zoning or the establishment of districts with adequate authority.

Plans for drainage districts should be examined to avoid unnecessary damage to wildlife, recreational resources, or agricultural interests and to prevent disadvantageous overlapping of two or more districts. Moreover, even well-planned districts soon lose their utility if ditches and drains are allowed to fall into disrepair. Federal assistance to land-drainage projects or districts should require provision for State review of new drainage projects and for maintenance of existing ones. Finally, loans or grants to public bodies for pollution abatement or for the purposes of municipal water supply should depend on the existence of adequate State legislation providing for the regulation of pollution and for reasonable withdrawal of underground waters.

Federal Coordination

Adequate planning, programming, and administration under a national water policy can only be achieved through close collaboration between the numerous

Federal agencies charged with the different aspects of water resources' development. Since coordination in the field of water resources to be effective must be tied in with land, minerals, energy, and other resource development, this function has been and is being developed through the Water Resources Committee as one unit of the work of the National Resources Planning Board.

The full job of adequate coordination in the field of water resources involves action, in cooperation with other agencies, for the preparation of plans for the unified regulation and development of the river systems of the country and the programming of actual construction of projects in the order of their urgency, so that the most beneficial sequence may be followed in the realization of these plans. It also involves the formulation of proposals for the integrated operation of projects once constructed.

In order that the plans and programs arrived at may be based on adequate knowledge and analysis of the physical, social, and economic factors involved, it is necessary to correlate and revise basic data relating to water resources and review all water plans; study water problems and the techniques for their investigation and for the formulation of water plans; and from time to time, prepare programs of coordinated investigations and surveys of water problems.

Further, the Board should be in a position to continue the study of water policy problems and to recommend desirable and practicable improvements in such a policy. It should continue to assist in planning and conducting investigations and negotiations designed to settle controversies over interstate streams. Under Executive Order No. 8455, the Board now examines all Federal project proposals in the field of water resources, and makes annual and special reports to the President and the Congress.

(c) Energy Resource Policies

The States and the Federal Government, without much attention to coordination, have introduced various measures aimed to facilitate wise use of energy resources. In the main, each of these efforts has been directed toward a single group of problems—the correction of demoralizing and wasteful practices and conditions in the petroleum and natural gas industries, the relief of economic distress and the promotion of safety in coal mining, or the protection and development of the public interest in water power. It is time to take a broader view. It is time to recognize more fully that these problems interlock, to weigh the conflicting interest and the differing points of view, and to resolve these conflicts in the interest of a national economy based on large-scale use of low-cost energy.

In the immediate foreground are new and heavy demands for energy to drive production for the national

defense. Measures are urgently needed to provide coal, oil, gas, and electric energy in the right places and in sufficient quantities; to guide the necessary expansion, on the one hand, but to avoid over-expansion, waste, and conflict, on the other. Emergency needs of the national defense program must be met, and measures to meet emergency needs will be more effective—not less effective—if they are also steps in long-range plans by resourceful men. Winning the skirmish of immediate needs must not mean losing the long-range battle of fundamental national strength and economic health.

The Conservation Principle

The objective of social policy toward the energy resources of coal, petroleum, natural gas, and water power is “conservation and wise use”—the principle established by Theodore Roosevelt more than 30 years ago. Conservation does not mean abstinence or hoarding; rather, it means wise use. It was expressed by the Energy Resources Committee in 1939 as the *avoidance of unnecessary waste* in the production and utilization of energy resources and the *safeguarding* in *economic health* of the industries and the people engaged in developing these resources.²

There is agreement on the general objective of conservation and wise use of energy resources because it coincides with the ultimate interests of all groups concerned—labor and capital, producer and consumer, State governments, and the Federal Government.

There is divergence of opinion only with respect to ways and means of attaining this objective. The three main fields of action described in the Committee's report of findings in 1939 were (1) promotion of greater efficiency in the production of energy resources, (2) promotion of greater economy in the use of fuels, (3) placing a larger share of the energy burden on lower-grade fuels and on water power.

The Need for Federal Action

Conservation places a special obligation on the Federal Government. It is clear (1) that parts of the task can be accomplished only by the Federal Government, through which the people as a whole have ultimate jurisdiction over the entire economy, (2) that the Federal Government—as the only agency representing the entire national interest—should insure that the public interest is focussed on the objective of conservation. Industries and producing States have vital roles to play. For the most part, Federal action at the present time is directed toward reinforcing their efforts. There are, however, interstate and inter-enterprise conflicts with which only the Federal Government can cope.

² *Energy Resources and National Policy*, National Resources Committee, January 1939, H. Doc. 160, 76th Cong., 2d sess.

Prevention of waste is primarily an economic problem of competition in the energy-resource industries. With the multiplicity of ownership and operating units and the legal framework within which they must operate, wastes are inevitable.

In the utilization of energy resources, the profit motive has led to increased efficiency because consumers of fuels find it to their interest to make their purchases go further. In production and distribution, however, private gain has not proved an adequate stimulus for all of the needs of conservation and, in fact, may be the chief cause of wasteful exploitation.

In the petroleum industry, for example, public action is apparently compelled because private enterprise, unaided, cannot deal with the problem of waste. Investment capital, reservoir energy, and petroleum reserves have been wasted as a result of efforts to obtain quick profits. Much of the responsibility for corrective action rests upon the Federal Government.

In most of the great river basins, the integrated control of storage and release of water is beyond the scope of private enterprise, local governments, or even of individual States; but a comprehensive development will make available many times as much economical water power as the limited and partial developments of the past. The amount and cost of water power will therefore depend largely on the extent of Federal or regional participation. Similarly, basic research in energy resources may be richly justified for the national interest.

Responsibility for the determination of general policy toward energy resources, therefore, rests primarily with the Federal Government, inasmuch as its duty is to function more broadly than industry or the governments of political subdivisions. The problem is to decide what the Federal Government should do, and also to determine what share of the total responsibility should be held by the industries and by the State governments.

Broad Objectives of the Program

The immediate objective of a prudent national policy in this field is to provide an effective supply of energy to drive the emergency program for national defense, through eliminating bottle-necks and straightening the flow of energy resource materials and through providing the necessary new supplies (including especially electric power) where they are most needed and where their presence will support a better and stronger industrial structure both for the emergency and for the longer view.

The underlying objectives are stated in broad terms as follows:

1. The program should strengthen the national economy for peace or war through greater efficiency

in production and greater economy in the use of mineral fuels; using where possible bituminous coal, of which there is an abundance in the ground and water power which is wasted if not used; reserving where possible the meagre known supplies of petroleum and natural gas for special duties to which they are essential.

2. The program should advance the public welfare and improve the living standards of the people through more efficient production, distribution, and utilization of an increased supply of energy; through the use of fuels and of water power for the purposes to which each is especially adapted; through protecting and improving labor standards and stabilizing employment in the energy resource industries, and guiding into less wasteful channels the inevitable competition of one resource with others.

3. The program should provide for continued investigation and planning by public and private agencies toward these objectives, emphasizing that immediate measures will be most effective for the emergency if they are also permanent foundation stones for long-range plans.

Coal: A Fuel and a Raw Material

For the immediate emergency, the special problems of supply for critical war needs should be attacked—the location of defense industries and fuel resources, the occurrence of raw materials other than coal, the adequacy of transportation facilities to meet emergency demands for coal.

In addition, measures should be adopted to reduce the impact of post-emergency dislocations to improve the means for rehabilitating displaced miners, to reduce short-term fluctuations in production, to provide supplementary employment for slack periods, and to discourage unnecessary over-expansion.

Since freight constitutes about half of the average delivered price of coal, large savings can undoubtedly be made through a coordinated plan for transportation by rail, water, and highway. Studies for this plan should include the quality and location of coal reserves, and the freight rate structure with respect to desirable trends in the location of industry, including the location of new or expanded industries to produce national defense materials.

In the longer view, known methods should be promoted and new methods developed for more complete extraction of coal, and especially of the better portions of the reserve supply, in the realization that these better deposits (as, for example, high grade coking coals) are but a fraction of the total tonnage in the ground.

Improved standards of operation and management should be enforced, including higher safety standards, not only to reduce injury and loss of life but also to prevent wasteful exploitation of reserves. The Federal and State programs should promote more orderly use of manpower in mining, through safety measures, through more regular employment, better standards of education, better living conditions, better working conditions, and better relations between labor and operators.

Investigation should be continued to improve methods for deriving and utilizing better fuels—coke, semi-coke, powdered coal, liquid fuel, and gaseous fuel—from coal and to develop additional by-products.

State and Federal regulation in the coal industry for all of these objectives should be re-examined in the light of recent experience and the new emergency needs of the national defense program.

Petroleum and Natural Gas

Petroleum products are absolutely essential to the national defense. Immediate steps are necessary to establish emergency powers adequate to control the allocation of production and refining among the various districts and to control the prices of petroleum and its products in relation to other fuels. Such emergency powers should be framed after reappraising the powers and forms of organization of the existing regulatory agencies, including those dealing with production, transportation, and marketing.

Creation of a Federal oil conservation body is recommended to administer the interests of the United States as a whole in oil and gas, to cooperate with the States in protecting the Nation against waste, and otherwise to pursue the objectives here stated.

For emergency purposes, there should be up-to-date estimates of requirements for oil and gas, these estimates to be used in controlling the development and extraction of reserves that are suitable for products of special military significance. Attention should be given to the desirability of expanding the military reserves and to their protection from commercial exploitation. The expansion of commercial production to meet emergency needs should be carefully planned to avoid waste and to minimize post-emergency disturbances.

A policy favorable to imports is recommended, particularly for grades of crude oil not readily available in the domestic market.

In the longer view and in designing emergency measures as parts of a long-range plan, the peculiar dependence of transportation motive power on petroleum products should be clearly realized. These mobile uses are compelling reasons for more efficient production and use of oil. The limited quantities of proved reserves in relation to sharply increasing consumption should be emphasized; the danger of an actual lack is

not imminent, but the prospect of definitely higher costs in world trade is not far off.

Over-production and waste of oil should be studied in relation to its distribution and to its consumption for less essential purposes. Those uses of petroleum for which available substitutes are relatively costly—notably lubricants and gasoline—should be protected. The use of oil and natural gas should be discouraged wherever heat or power from other sources is suitable and economic and where the factor of convenience is not important.

In the production field, it is essential for the Federal Government and the States together to devise, adopt, and enforce methods leading to more stability as well as to less waste and conflict. Unit operation of petroleum pools is desirable, and to this end it is recommended that direct and indirect means be adopted for stimulating the pooling of lease and royalty interests. The principle of correlative rights and of ownership-in-place should be substituted for the "rule of capture;" to encourage this, better methods for measuring underground reserves should be found. The problem of regulating production in fields located far from adequate markets should be attacked.

Water Power and Electric Energy

Immediate attention must be directed toward the sharp increase in electric energy requirements that is already taking place through the emerging national defense activity and its stimulating effect on nearly all activities. Insofar as the plants and machinery can be constructed, it will be the part of prudence to maintain enough reserve generating capacity to care for war-time needs without curtailment of essential civilian demand and to avoid the actual storages of power already threatening in various places. Hydroelectric plants at multiple-purpose public reservoirs are particularly adaptable and economical for this purpose.

Where sufficient generating capacity cannot be constructed or cannot be constructed in time, serious attention should be given to planning the inevitable curtailment of usage so as to minimize the dislocation of defense production.

In planning the construction of electric generating capacity for emergency needs, consideration should be given to developing industries in new locations as well as in established industrial centers.

In general, hydroelectric power will supplement steam-electric power—not replace it; power at storage reservoirs is best suited in general to carrying high peak loads of short duration which do not require much fuel but are expensive to carry with steam-electric equipment. Economically sound multiple-purpose water projects should be developed for power as well as other

water uses; water power is wasted if not used, and these projects should take their proper place in meeting the expanding demand for electricity while conserving petroleum, natural gas, and high-rank coals, and reducing the cost of the total energy supply.

Fuel-electric plants should be constructed in conjunction with public hydroelectric plants where necessary to provide the best balance in their combined capacity, and to utilize each energy resource for its most efficient function in a coordinated program of low-cost power supply.

Power production and mainline transmission from multiple-purpose water control projects should be operated under public auspices, following the established policy of preference in distribution to the States, their political subdivisions, and non-profit cooperatives.

Transmission of electric energy is in many social and economic essentials closely akin to transportation of commodities. For the electric requirements of the future, the national interest will be served best by coordinated systems of interconnections that will make available in wider markets energy derived from the most economical sources, whether large-scale hydroelectric plants or efficient steam plants. Transmission systems of the present were integrated from smaller units to meet compelling needs for more energy supply at lower costs. There is no indication that this growth will not continue. For most industrial regions, at least, the outlook is for twice as much demand within the next decade or so. Such greatly increased needs will call for systems of supply based on large efficient steam-electric generating stations in areas of low-cost fuel, coordinated with storage hydroelectric plants by transmission networks extending over several States.

A basic system of publicly operated high-tension lines will speed this necessary development. Transmission links between important load centers and power sources should be planned immediately as elements in such a back-bone system, not only for economy but to protect the power supply of industrial regions vital to the national defense.

Wider use and lower cost of domestic and rural energy supply should be advanced through promotional rate schedules, more progressive service, and extension of lines; through encouraging the development and wider distribution of low-cost efficient electric appliances, designed for the requirements of farm users and of lower-income groups, with financing at low interest rates by manufacturers, utilities, or public credit agencies. In the future as hitherto, public power developments may appropriately take the lead in these policies, particularly through cooperative action with the Rural Electrification Administration.

The influence of electric power costs on the location and growth of industry, including the possibility of pro-

moting balanced industrial development, and on other economic activity should be studied by appropriate local, State, regional, and Federal agencies. Continued study is recommended to improve the methods by which low-cost electric energy can contribute toward a healthy and diversified agriculture, as, for example, through refrigeration, quick freezing methods, and mechanization of farm processes.

(d) Transportation Needs and Principles of Expenditure

The significance of transportation as a tool for national development has long been recognized by the Federal Government. This recognition has been expressed by the construction, maintenance, and operation of physical plant, by financial aid through loans and grants, and by the furnishing of extensive auxiliary transportation services. The history of American transportation has, in fact, been in no small degree the history of Federal activity.

Today, the tremendous expansion of Federal participation in the field of transportation is measured in appropriations aggregating billions of dollars. For highways, continuing substantial grants of monetary aid reenforced by engineering and administrative counsel have been a significant factor in the phenomenal development of an integrated nationwide system of motor transport and the accompanying expansion of vehicle ownership and use. In the development of waterways, accomplishments for the past century have been almost exclusively through Federal action, resulting in the availability to American shipping of adequate harbors and channels on the oceans, the Great Lakes and the inland river systems, as well as in extensive aids to navigation and financial assistance in ship construction and operation. Railroads in pioneering times were the recipients of extensive land grants from the Federal Government, and in recent years aid has been directed in the form of loans. Finally, air transportation, the newest object of Federal support, has been developed by means of Federally owned and operated airways, airport construction, air mail subsidies, and technical research without which current attainments would have been impossible. These promotional activities have been augmented by regulatory policy directed toward preserving all forms of transport.

Although the recent past in Federal sponsorship has been one of intense activity, the future appears to compel an even greater role. Today, increasing rates of technological development and modernization have been joined by the compelling force of national defense to produce unparalleled national responsibility for the achievement of an adequate, efficient, and up-to-date national transportation system. In air transportation, it would be impossible to predict the effect upon airway

and airport facilities of current trends in the development of this new medium. Not only are these facilities to a large extent defective and inadequate in the light of present achievements in commercial and private aviation, but necessity for enormous improvements appears in connection with current phenomenal increases in airplane productive capacity, pilot training, and goals set for the military air force. Today, most of the airports in the United States are classified either as of lowest rating or as failing to meet adequate standards of classification. Plans were recently recommended for a half billion dollar airport program in the attempt to overcome some of these defects in size, lack of paved runways, inadequate lighting, and other equipment needs. Further technical improvements in airplanes are certain to accelerate obsolescence in present facilities, and growing defense requirements may give impetus to mass plane production similar to that provided for motor vehicle production by the last world war. Because of the predominantly national interest in this method of transportation, therefore, it appears that Federal financing and control will continue to be extended.

Needed highway development, as outlined in the master plan of the Public Roads Administration, also suggests a high volume of Federal activity in the future. The unsuccessful attempt of American highways to keep pace with the development of the motor vehicle has resulted in transportation inefficiencies expressed in accidents, congestion, delay, and inconvenience. Not only is there need for modernization of the present Federal-aid system, but also for a system of direct inter-regional highways with connections through and around cities designed to meet the requirements of defense and peacetime traffic. Especially important and costly will be the modernizing of heavy-traffic highways in or about metropolitan centers. In addition, the Federal Government has recently assumed new responsibilities in the secondary road and grade-crossing programs. Adding to this normal plan of development the requirements of national defense resulting from the development of a mechanized and motorized army, and considering the new use of highways in connection with training maneuvers, the future road-building program assumes very considerable proportions. At the present time, there is immediate necessity for bringing 75,000 miles of strategic highways to standards set by the War Department, and additional need for several thousand miles of access roads to military reservations and to the sites of newly located armament plants.

With regard to the promotion of water transport, a far-reaching system of inland and coastal facilities is virtually completed. With few exceptions, the natural streams have been improved and supplemented so as to provide a broad fan of waterways in the Mississippi

basin, a fringe of channels extending inward from the ocean and Gulf coasts, and a major route through the Great Lakes. Their economical use will, however, require expenditures to remove existing bottlenecks, to fill gaps in the network, and to bring all channels to proper project depth. The largest single project immediately before the Nation is the St. Lawrence Waterway project. Further developments may be expected to involve the interconnection of major river systems, the deepening of channels, or the improvement of more small feeders to the major waterways. Other possibilities are the development of certain defense harbor needs, and the construction of additional dams for joint transportation, power, and irrigation purposes.

The outlook for Federal promotion is less clear in the railroad than in other transport fields. Although there appears to be no need for extension of facilities, considerable reconstruction of roadbed and purchase of new equipment will be necessary to modernize rail service, and where such investments may be more compulsory from the viewpoint of national defense or social objectives than from the viewpoint of carrier profitability, Federal action may be deemed advisable. This may take the form of further loans or grants, or even public ownership of certain facilities.

Indication of these extensive and multiplying responsibilities of the Federal Government in future transportation development emphasizes the need for careful formulation of principles to lead away from further unrestricted expansion to careful evaluation of the proper relationships among the several media, and to the requirements of modernization and efficient operation. Vague objectives designed to stimulate the provisions of a greater supply of facilities have, therefore, become of little value in guiding a wise overall development of transportation in the national interest. Such considerations point to the usefulness of directing more attention to the planning of transportation facilities to avoid the unnecessary wastes resulting from haphazard development and from a narrow and short-run viewpoint.

Both Houses of Congress recently called attention once again to the need for a national policy aimed at providing a transportation system adequate to meet the needs of the commerce of the United States, of the Postal Service, and of the national defense. It was further stated to be the purpose of the Congress to recognize and preserve the inherent advantages of each mode of transport. The following principles are accordingly suggested as guides to the realization of these achievements:

1. The present development of each transportation agency through unrelated legislative policies carried out

by independent bureaus should be supplanted in future Federal activity by coordinated action in terms of an over-all transportation objective. This objective should be expressed in terms of the development and preservation of a transportation system representing an optimum combination of economy, speed, safety, and convenience, and designed to further policies of the Federal Government with respect to such factors as resource utilization, industrial location, distribution of population, land-use planning, the diffusion of culture, the maximizing of income, and the national defense.

2. In the light of the established transportation objective, amendments should be directed to the current contradiction in Federal action which seeks the unrelated development of competing facilities, and at the same time, regulates the use of facilities to achieve coordination.

3. Criteria should be established for determining the need and justification for Federal expenditure in order to minimize the influence of special pleadings irrelevant to the expressed transportation objective.

4. Where the provision of transportation facilities is established as a work-relief project designed to conserve human resources as well as to furnish a needed service, there should be a coordination of the two objectives to permit the optimum realization of both.

5. In the programming of expenditures, priority should be granted to projects of demonstrated national defense value, but it must also be realized that, in general, the proper development of peacetime transportation requirements is a primary contribution to adequate defense.

6. There should be more thoughtful definition of the scope of Federal interest in the control and financing of transportation facilities, and of the extent to which direct Federal action, intergovernmental cooperation, or local autonomy is most desirable.

7. Federal action should be directed toward the achievement of greater harmony among the several transport agencies in order to eliminate hostilities and promote greater interagency cooperation.

8. With the current attainment of an extensive transportation plant, emphasis upon the modernization and efficient operation of existing facilities requires the substitution of planning techniques for haphazard growth.

It is believed that in view of the crucial importance of transportation as a facilitating function for the commerce of the Nation, some such principles must be developed to guide future Federal action toward obtaining through our vast transportation investment the optimum results in terms of a progressing American standard of living.

F. RECOMMENDED SIX-YEAR PROGRAM

1. Summary

The six-year program of public works construction and construction financing by the United States Government presented in this section is divided into three parts:

The first part (Table No. I) consists of projects recommended for construction during the fiscal year ending June 30, 1942, by the construction agencies (Class I) as defined by Executive Order No. 8455.¹ These agencies build works and structures that are owned and operated by the Government.

The second part of the program (Table No. II) consists of the estimated volume of construction recommended to be financed during the fiscal year ending June 30, 1942, by the construction agencies (Class II) as defined also by Executive Order No. 8455.² These agencies make grants, loans, or guaranties of loans for construction by both public and private agencies.

The third part of the program (Table No. III) summarizes those projects available for construction by the construction agencies (Class I) for the years following the fiscal year 1942.

The estimated cost of new construction to be built or financed by the United States Government during the fiscal year ending June 30, 1942, is \$3,664,468,000. The actual amount of Federal expenditures or financing involved in that estimated cost is \$3,157,768,000. The difference of \$506,700,000 between the two figures represents the estimated additional expenditures to be made by State and local governments and by private corporations and individuals on construction work for which grants, loans, or guaranties of loans will be provided by the Federal Government.

In comparison, the estimated amount of Federal expenditures for, or financing of, new construction work during the fiscal year 1941 is \$3,935,448,000, and during the fiscal year 1940 it was \$3,127,159,000. The accompanying table shows these amounts for the past ten fiscal years.

Of the \$3,157,768,000 of Federal expenditures for, or financing of, projects, approximately \$1,941,268,000 will be in the form of withdrawals from the Treasury during the fiscal year 1942, while the balance of \$1,216,500,000 will be comprised of disbursements or

Fiscal year	Federal expenditures for new construction	Federal financing of new construction			Total Federal expenditures for and financing of new construction
		Grants and loans	Guaranties of loans	Total	
1933.....	\$316,503,000	\$195,233,000	-----	\$195,233,000	\$511,736,000
1934.....	354,901,000	1,090,386,000	-----	1,090,386,000	1,445,287,000
1935.....	443,197,000	1,060,425,000	\$12,389,000	1,072,814,000	1,516,011,000
1936.....	545,236,000	1,548,426,000	195,412,000	1,743,838,000	2,289,074,000
1937.....	660,908,000	1,821,842,000	399,026,000	2,220,868,000	2,881,776,000
1938.....	564,734,000	1,378,385,000	427,003,000	1,805,388,000	2,370,122,000
1939.....	584,147,000	2,151,341,000	672,954,000	2,824,295,000	3,408,442,000
1940.....	664,114,000	1,760,398,000	702,647,000	2,463,045,000	3,127,159,000
1941.....	1,533,848,000	1,436,600,000	965,000,000	2,401,600,000	3,935,448,000
1942.....	1,156,768,000	1,160,000,000	835,000,000	2,001,000,000	3,157,768,000

guaranties of loans by some of the loan agencies of the Government which, because of their corporate organization, do not operate from the general fund of the Treasury. Thus, the latter figure of \$1,216,500,000 will not represent Treasury withdrawals.

The estimated cost of \$3,664,468,000 for new construction during the fiscal year 1942 is broken down as follows:

1. An expenditure of \$1,156,768,000 for new construction by the construction agencies (Class I) is recommended in the Budget of the United States for the fiscal year 1942 (Table No. I). This expenditure represents the estimated cash disbursements by the construction agencies (Class I) during the fiscal year by reason of (1) appropriations that are recommended in the Budget, or (2) the unexpended balances of appropriations made for previous fiscal years that will still be available for expenditure in the fiscal year 1942. In comparison, this expenditure during the fiscal year 1941 is estimated to be \$1,533,848,000, and during the fiscal year 1940 it was \$664,114,000. The large increases during the fiscal years 1941 and 1942 are accounted for by the increase in defense construction.

The recommended expenditure of \$1,156,76,8000 for the fiscal year 1942 will be for projects serving the following general purposes:

Water use and control.....	\$273,436,000
Public land development.....	20,208,000
Transportation.....	123,949,000
Defense.....	595,451,000
Government plant.....	52,624,000
Housing.....	91,100,000
	<hr/>
	1,156,768,000

The largest share of the expenditure recommended for water use and control will be for flood control projects; in the case of transportation, it will be for rivers and harbors work, airport development, and the Panama Canal; and in the case of Government plant, it will be for public building construction.

The total estimated cost of the projects recommended

¹ Construction agencies (Class I) as defined by the Order include those that "plan, initiate, undertake, or engage in construction financed in whole or in part by the Federal Government, by contract, force account, Government plant and hired labor, or other similar procedures."

² Construction agencies (Class II) as defined by the Order include those that "aid construction activity through grants-in-aid, loans, or other forms of financial assistance or through guaranties from the Federal Government."

for construction by the construction agencies (Class I) during the fiscal year 1942 is \$6,155,523,000, of which it is estimated that \$2,921,228,000 will have been spent prior to June 30, 1941, and \$2,077,527,000 will be required to complete the projects in the years following the fiscal year 1942. The distribution of the expenditure of \$2,077,527,000 in the fiscal years following 1942 cannot be forecast with any accuracy, since the amounts to be involved will ultimately depend upon the future decisions of the President and the Congress. However, using the recommended figures for the fiscal year 1942 and the construction agencies' current estimates of the expenditures that they believe will be required for the years thereafter, the following table shows the situation with respect to the projects for which expenditures have been recommended during the fiscal year 1942:

Total estimated cost.....	\$6, 155, 523, 000
Expenditure prior to June 30, 1941.....	2, 921, 228, 000
Recommended expenditure during fiscal year 1942.....	1, 156, 768, 000
Estimated expenditure, fiscal year 1943.....	426, 909, 000
Estimated expenditure, fiscal year 1944.....	345, 469, 000
Estimated expenditure, fiscal year 1945.....	239, 119, 000
Estimated expenditure, fiscal year 1946.....	183, 308, 000
Estimated expenditure, fiscal year 1947.....	64, 363, 000
Estimated expenditure for the fiscal years after 1947 to complete the projects.....	818, 359, 000

It should be made clear, however, that the above estimates of expenditures for the fiscal year 1943 and thereafter do not all represent contractual commitments. A portion of such expenditures are, of course, covered by continuing contracts, while the balance represents a plan on the part of the construction agencies to complete a project subject to the decisions of the President and the Congress. In one sense, such commitments represent something of a "moral" obligation of the Government.

Viewed from another standpoint, the additional expenditures that will be required in the years after 1942 to complete projects recommended for construction in 1942 provide one part of the "reservoir" or "back log" of public works construction required by the Employment Stabilization Act of 1931. Of course, another part of that reservoir consists of those projects upon which construction is not recommended during the fiscal year 1942 but which are available for construction during later years (see Table No. III).

2. The estimated cost of new construction during the fiscal year 1942 that involves recommended Federal financing by means of grants, loans, or guaranties of loans by the construction agencies (Class II) is estimated to be \$2,507,700,000 (Table No. II). Of this amount, the recommended Federal share, upon the basis of estimates contained in the Budget of the United States, is \$2,001,000,000. It is recognized that this estimate

may be in error to the extent that it depends upon the willingness of the prospective recipients of the grants or loans to assume the obligations entailed. The estimate of \$2,001,000,000 for the Federal share is based, however, upon the best estimates of the construction agencies (Class II) concerned.

The Federal share of such construction financing divided among the types involved is approximately as follows:

Type of Financing	Federal financing	Total estimated cost of construction to be financed
Grants-in-aid.....	\$789, 000, 000	\$1, 113, 000, 000
Loans.....	377, 000, 000	429, 200, 000
Guaranties of loans.....	835, 000, 000	965, 500, 000
Total.....	2, 001, 000, 000	2, 507, 700, 000

The third part of the program, summarizing those projects proposed for construction by the construction agencies (Class I) for the years following the fiscal year 1942, includes \$2,346,013,000 of projects none of which have been recommended for construction during the fiscal year 1942 (Table No. III). These projects comprise the bulk of the reservoir of Federal public works construction, envisioned by the Employment Stabilization Act of 1931, from which selections may be made in future years.

The total estimated amount of work necessary to complete these projects, distributed according to the purposes the projects will serve when built, is as follows:

Water use and control.....	\$1, 679, 070, 000
Public land development.....	211, 611, 000
Transportation.....	151, 528, 000
Government plant.....	303, 804, 000

Total..... 2, 346, 013, 000

It cannot be assumed that all of these projects could or should be started immediately if the funds were available to undertake them. There are two reasons for this:

1. The plans for these projects are in various stages of preparation. It is estimated that of the total \$2,346,013,000 of projects in the reservoir, plans have not been begun for \$171,718,000 of the work; sketch plans are in preparation for \$271,845,000; sketch plans are completed for \$478,583,000; detailed plans are in preparation for \$401,938,000; and detailed plans are completed for \$265,518,000; the status of the plans for \$757,410,000 has not been reported. Consequently, only approximately \$667,456,000 of projects appear to be ready for undertaking if funds were to become immediately available. The balance of \$1,679,556,000 in the reservoir might require some time to be placed under construction even though the funds were available, since construction must await the preparation of plans. It is estimated that a sum of \$85,000,000 would

be required to provide the necessary plans before construction could begin on projects in the reservoir.

2. Many of the projects as proposed are not in harmony with other national, regional, State, or local developmental plans, and adjustments must be made by study of the apparent conflicts or further investigation of the proposed design or location of the projects. The resolution of these conflicts requires the correlation of the plans of the agencies involved before the projects can be recommended for construction.

Accordingly, the projects have been placed in four groups: (1) *Group A* to be undertaken when funds are available; (2) *Group B* to be deferred because of conflicts with other plans; (3) *Group C* which is indeterminate; and (4) *Unevaluated*—all those projects proposed and now under study but upon which no opinion has yet been placed.

Continuous study will allow an annual revision of the third part of the program (Table No. III) so that projects placed in one group one year may be moved into another group the next year, while those projects now under study and upon which no opinion has been given this year will be placed within one of the other three groups in the next annual revision of the program.

2. Procedures in Developing The Program

The policy of providing for the planning and programming of the public works construction of the Federal Government was first declared by the Congress in the Employment Stabilization Act of 1931. This act provides for the advance planning of public works by the construction agencies of the Federal Government (as defined in the Act) and by the Federal Employment Stabilization Board established by the Act. The Act directs that each construction agency of the Government shall "prepare a six-year advance plan with estimates showing projects allotted to each year," such estimates to show separately "the estimated cost of land, the estimated cost of new construction and the estimated annual cost of operation and of repairs and alterations." Also, each construction agency must keep its six-year plan up to date by an annual revision of the plans and estimates for the unexpired years and by annually estimating the plans and estimates for an additional year. Such programs, plans, and estimates for the six-year period are to be submitted annually to the Board and to the Director of the Bureau of the Budget.

In August 1932, the Federal Employment Stabilization Board collected for the first time from the Federal construction agencies the six-year programs of Federal public works construction prepared by the agencies under the Act. From 1933 to 1934, when the last appro-

priation was made for the Stabilization Board, or Office³ as it was then known, it continued its activities of serving as a central clearing house for the Federal agencies' programs. In 1936, following the cessation of activities of the Stabilization Office due to lack of funds, the President requested the National Resources Committee to assume the responsibility for the annual revision of the Federal six-year program.⁴

Three revisions of the six-year program of public works were made by the National Resources Committee from 1936 to 1938. Each year during this period, consolidated programs based upon the revised programs as submitted by the construction agencies were submitted by the Committee to the President and to the Bureau of the Budget.

Under the terms of the Reorganization Plan No. 1, effective on July 1, 1939, the National Resources Planning Board was created in the Executive Office of the President, and the powers, duties and functions of the National Resources Committee were transferred to the National Resources Planning Board along with the powers, duties and functions of the Federal Employment Stabilization Office. Also, on September 8, 1939, the President, by Executive Order No. 8248, which defined the responsibilities of the divisions of the Executive Office of the President, directed the National Resources Planning Board to consult with the Federal agencies in "developing orderly programs of public works, and to list for the President and the Congress all proposed public works in the order of their relative importance with respect to (1) the greatest good to the greatest number of people, (2) the emergency necessities of the Nation, and (3) the social, economic and cultural advancement of the people of the United States."

Following the issuing of that order, a series of conferences between the staffs of the Board and the Bureau of the Budget was inaugurated for the purpose of developing procedures to assist the President in the operation of his Executive Office so as to facilitate the budgeting, planning, and programming duties for which the President was made responsible under the terms of Reorganization Plan No. 1, and particularly, the programming activities for which the Board was made responsible by the President under the terms of Executive Order No. 8248. As the result of these conferences,

³ Under the authority of the Economy Act of 1933, the President by a series of Executive Orders abolished the Federal Employment Stabilization Board and transferred the powers, duties and functions of the Board to a Federal Employment Stabilization Office established within the Department of Commerce.

⁴ The National Resources Committee had assumed the powers and duties of the National Resources Board, which, in turn, had succeeded to the powers, duties and functions of the National Planning Board established by Administrator Ickes of the Public Works Administration to advise and assist the Administrator in the preparation of the comprehensive plan of public works authorized by sections 201 and 202 of the Recovery Act. Thus, the duties of the Stabilization Office and those of the Resources Committee (as derived from the Resources Board and the Planning Board) were practically the same, i. e., the responsibility for the preparation of comprehensive public works programs.

the President issued Executive Order No. 8455 on June 26, 1940.

Briefly, Executive Order No. 8455 provides for five things:

1. It covers within the provisions of the Employment Stabilization Act all construction agencies of the Government not enumerated by the Act, and groups these agencies into two classes: construction agencies (Class I) which plan or undertake construction directly for the Federal Government; and (2) construction agencies (Class II) which participate in construction indirectly, or which affect construction activity by means of loans, grants or other Federal financial assistance.

2. The construction agencies (Class I) are required to prepare and keep up to date six-year programs of public works construction and to submit such programs to the Bureau of the Budget in September of each year, at the time they submit their budget estimates.

3. Provision is made for the continuous reporting to the Executive Office of the President by the construction agencies (Class I) of surveys or investigations directed toward the preparation of plans or estimates for construction projects and of the preliminary plans or estimates for the construction projects themselves.

4. The construction agencies (Class II) are required to submit such information on their advance plans and programs as the National Resources Planning Board may request.

5. The Director of the Bureau of the Budget and the Chairman of the National Resources Planning Board are empowered jointly to make such rules and regulations as may be necessary to make effective the provisions of the Executive Order.

In accordance with the authority provided in section 9 of the Order, Regulation No. 1 of the rules and regulations to be issued under the authority of the Order was first issued by the Director of the Bureau of the Budget and the Chairman of the Board on July 16, 1940, and the entire planning and programming procedure for the construction agencies (Class I) provided for by the Executive Order was established.

The staff work to carry on this procedure was at once inaugurated jointly by the staffs of the Bureau of the Budget and the Board. It was directed toward the development of a six-year program of public works, coincidental with the preparation of the Budget, which could be reported beginning in January 1941 to the President and to the Congress at the time of or immediately following the annual Budget Message. The President had indicated that such a six-year program should have as its first year the Budget estimates and a developing program for the balance of the six years.

Section 6 of Regulation No. 1 issued under Executive Order No. 8455 provides that the National Resources Planning Board and the Bureau of the Budget will

jointly maintain a record system for the reports on surveys and plans for construction projects required by the Executive Order.

Accordingly, such a project record system was established jointly by the Bureau of the Budget and the Board late in July 1940, immediately following the issuing of Regulation No. 1. The Chairman of the Board established the docket number system, subject to such further modifications as may be required from time to time. When a report on a survey or on plans or estimates for a construction project is submitted to the Executive Office by a construction agency, a docket number is assigned to the survey or the construction project involved, in accordance with the system established by the Chairman of the Board, for use and reference in all actions relating to the survey or construction project.

As a first step in aiding the construction agencies to organize their administrative procedures in order to comply with the provisions of Executive Order No. 8455 and Regulation No. 1, a series of joint conferences attended by representatives of the construction agencies, the Bureau of the Budget, and the National Resources Planning Board was arranged. During these conferences, the provisions of Regulation No. 1 were interpreted in the light of the operating practices and conditions prevailing in each construction agency.

As was made clear at these conferences, the procedure embodied in the Executive Order No. 8455, and the rules and regulations issued thereunder, departs from what was followed in the past years in one important respect. Previously, detailed information on plans and estimates for project proposals and proposed six-year programs of construction expenditures have both been reported by the construction agencies at the same time and on the same form just ahead of the Budget hearings in the fall. Under the new procedure, only the six-year program of proposed construction expenditures is to be reported annually, while information on plans and estimates for project proposals is to be reported throughout the year as projects develop in the construction agencies.

The continuous reporting of project information on proposed projects is designed to provide a complete history of each project from the time of its inception to the time of the completion of its construction. Submission of these reports to the Board and the Bureau of the Budget provides a complete record in the project record system of each proposed construction project. Also, the projects so proposed constitute a reservoir of construction projects as contemplated in the Employment Stabilization Act. This reservoir will be constantly replenished by the accession of new project proposals and will be constantly depleted by the bringing to completion of construction projects reported in the past.

Section 8 of Regulation No. 1 issued under the authority of the Executive Order provides for the procedure to be used in correlating the reports on proposed projects by making possible the forwarding of such reports to each construction agency that may be affected or concerned by the proposed activity reported. As promptly as possible, an agency to which such a report has been referred by the Board is required to report any conflicts with any of its activities then in progress or contemplated, along with its recommendations for suitable adjustment of these conflicts.

The process of planning correlation undertaken by the Board also involves an evaluation of the various project proposals by means of two different types of operations: (1) The representatives in Washington of the Federal agencies that are concerned with particular types of project proposals review and evaluate the proposals. Such evaluations proceed through the technical committees of the Board that deal with the development of the particular resources concerned, such as water resources, land resources, power development, etc.; (2) through its regional offices, the Board also attempts, where practicable, to clear the project proposals with regional, State, and, when necessary, local planning agencies. A number of administrative devices have been used to effect the field correlation: through the drainage basin committee organization maintained by the Board; through regional planning commissions composed of representatives of the Federal and State agencies concerned in the area; and through various temporary areal planning and study groups organized for particular jobs.

The planning correlation is made in terms of the conformance of a project to national, regional, State or local development plans that are affected. For that purpose, the projects are placed in four groups as follows:

(1) *Group A* includes projects that are recommended for early construction. These projects give evidence of being desirable parts of a development plan for a function, area, or activity and do not conflict with any other national, regional, State, or local development plans for the function, area, or activity involved. These projects are of such value that they should be undertaken as soon as possible.

(2) *Group B* includes projects that should be deferred because: (1) as proposed, they conflict with other national, regional, State, or local development plans (or further investigation is needed to demonstrate their freedom from such conflict), but they are of such value that they should be undertaken as soon as possible after the conflict has been resolved; or (2) although as proposed they do not conflict with any other regional, State, or local development plans, they should be deferred to follow projects in Group A.

(3) *Group C* includes projects that are not recom-

mended for construction at the present time or in the immediate future.

(4) *Unevaluated* includes projects for which no evaluation was possible because of the immediate lack of information, or because in the short time involved, the Board was unable to evaluate the project.

As a first step in applying the above evaluation grouping, a classification is made of the proposed projects by dividing them into categories according to the purpose the project will serve after it is built. The categories are: (1) water use and control, (2) public land development, (3) transportation, (4) defense, and (5) Government plant. The evaluations are made prior to the time that the Budget hearings are begun.

Unfortunately, the time allowed for this work during 1940 was very limited, so that the evaluations that were made did not include all of the projects proposed by the construction agencies.

3. Planning, Programming and Budgeting

The relationship between planning, programming, and budgeting for the public works construction of the Government is one of time sequence. Planning of projects precedes the formulation of public works programs. Public works programs comprise a group of planned projects arranged in an order determined by an over-all development plan. Budgeting, in this connection, is the process of selecting well-planned projects from a program in the light of the finances available, with due regard to the future financial commitments that the construction of such projects will involve.

Under the terms of Executive Order No. 8455 and the rules and regulations issued thereunder, the Board is responsible for receiving and correlating plans for public works construction projects proposed by the various construction agencies of the Government. The Board's planning involves close scrutiny, careful analyses, and correlation of the development plans for the activity, functional purpose, or geographic area that may be involved. These plans are studied in advance of any proposals from the Federal agency to include such projects in its program or in its Budget estimates.

Coincidental with the preparation of the Budget in the fall of each year, the Board then develops a six-year program to be reported to the President and to the Congress at the time or immediately following the annual Budget Message. While the annual Budget is in preparation, the Board is then able to advise the President and the Bureau of the Budget as to whether projects included in the construction agencies' six-year programs and budget estimates are in harmony with national, regional, State, or local development plans. The staffs of the Bureau of the Budget and of the Board work together closely during this period.

This process of correlating the many project proposals and organizing them into a program yields a number of byproducts that are invaluable to the improved administration of Federal Government functions. In the first place, potential conflicts between projects are disclosed very early. For illustration, it is possible that two projects proposed by entirely different agencies may compete with each other for a site, or for the use of the same river for incompatible purposes. The proposing agencies are encouraged to resolve conflicts such as these before the projects are submitted to the Bureau of the Budget for an estimate of appropriation needs. Likewise disclosed are the possibilities for supplementation, such as the modification of a proposed project so that it may serve several purposes instead of only one, or that it may aid rather than hinder another related project. The very process of organizing project proposals into a construction program encourages the development by the construction agencies of rational development plans for the functions or geographic areas involved. Project evaluation, as it is participated in by officials from the various construction agencies, tends to induce the proposing agencies to raise the general level of soundness of the projects they submit for Budget Bureau estimates. The Bureau of the Budget in passing on proposals is armed with the considered judgments of experts as to the value of the proposals to the development of the national estate.

The six-year program as reported by the Board has as its first year the Budget estimates (Tables Nos. I and II of this section) and a developing program for the remaining 5 years (Table No. III of this section). The projects contained in the balance of the 5 years of the Board's program are not scheduled by fiscal years but are grouped first according to the purposes the projects will serve after they are built, such as water use and control, public land development, transportation, etc., and second, within each purpose group the projects are placed into four evaluation groups as outlined above: (1) Group A (immediate); (2) Group B (deferred); (3) Group C (indeterminate); or (4) Unevaluated. The reservoir of work envisioned by the Stabilization Act thus comprises both the estimated annual expenditures necessary to complete after the first year those projects that are recommended in the first year of the program, in this case the fiscal year 1942, and the projects in the remaining 5 years of the six-year program.

The reservoir of projects that is maintained in the project record system is constantly being turned over

so that the Board reviews its evaluation of each project annually. There are, of course, many projects in the reservoir that are not contained in the construction agencies' programs but upon which the Board has placed evaluations in anticipation of the time that such a project might be included in the programs.

The method outlined above for presenting the Board's program provides flexibility from three standpoints:

(1) It enables a selection of projects from the reservoir of the Group A projects for construction as soon as funds are made available.

(2) The functional purpose classification of the projects means that the Government may, as its policy dictates, embark upon either a program of public land development, water use and control development, or transportation development and have available a program in any of the functional fields.

(3) By not scheduling the projects according to fiscal year, a flexibility, insofar as financial resources is concerned, is provided, since there is no advance commitment to undertake any of the proposed projects that are available for construction.

4. Lists of Projects

The recommended program for the fiscal year 1942 comprises two tables:

Table No. I.—Projects recommended for construction by the construction agencies (Class I). The projects are arranged according to the agencies responsible for their construction.

Table No. II.—Estimated construction financing by the construction agencies (Class II). The estimates are arranged according to the agencies responsible for the construction financing.

The program for the fiscal years after 1942 comprises one table:

Table No. III.—Projects available for construction in later years as prepared by the construction agencies (Class I). The projects are arranged according to the purpose they will serve when built and in operation.

Table No. III is further divided into four major sections covering projects whose purpose is: water use and control; public land development; transportation; and Government plant.

A detailed explanation of each table and notes and supplementary information concerning the table precede each one.

TABLE NO. I

PROJECTS RECOMMENDED FOR FISCAL YEAR 1942

This table includes the projects recommended for construction by the construction agencies (Class I) during the fiscal year 1942 in the Budget of the United States Government. The expenditure of \$1,156,768,000 that is recommended does not include allotments from work-relief funds, these being reported separately in Table No. II under the work-relief agency involved.

The largest share of the recommended expenditure for construction in 1942 is for defense purposes, in the amount of \$595,451,000. Projects involving water use or control are next largest, the amount being \$273,436,000. For comparative purposes, a classification of the expenditures since 1921 of the construction agencies (Class I) according to the purposes the projects serve is as follows:¹

[All figures in thousands of dollars]

Fiscal Year	Water use and control	Public land development	Transportation	Defense	Government plant	Housing	Total
1921.....	\$6, 073	\$6, 511	\$91, 552	\$66, 863	\$10, 357	-----	\$181, 356
1922.....	4, 946	6, 299	61, 391	27, 023	17, 961	-----	117, 620
1923.....	5, 659	6, 484	63, 609	22, 237	15, 237	-----	113, 126
1924.....	6, 782	7, 822	91, 448	12, 636	14, 494	-----	133, 182
1925.....	3, 899	13, 067	92, 247	8, 331	8, 584	-----	126, 128
1926.....	3, 390	12, 721	72, 352	10, 258	8, 955	-----	107, 676
1927.....	21, 619	14, 017	54, 292	12, 711	16, 566	-----	119, 205
1928.....	23, 516	14, 421	61, 683	11, 173	16, 923	-----	127, 716
1929.....	36, 283	16, 630	62, 244	21, 236	51, 945	-----	188, 339
1930.....	32, 225	15, 466	61, 295	19, 935	69, 775	-----	198, 696
1931.....	45, 297	27, 356	70, 624	39, 778	104, 037	-----	287, 092
1932.....	51, 588	25, 385	75, 491	43, 879	138, 991	-----	335, 334
1933.....	59, 199	19, 496	64, 165	26, 422	147, 221	-----	316, 503
1934.....	76, 496	34, 291	90, 495	50, 076	101, 166	\$2, 377	354, 901
1935.....	109, 519	47, 789	144, 490	48, 377	84, 008	9, 014	443, 197
1936.....	140, 626	79, 612	159, 702	31, 837	99, 852	33, 607	545, 236
1937.....	142, 073	96, 039	156, 322	42, 729	123, 753	99, 992	660, 908
1938.....	176, 668	38, 190	113, 384	49, 354	108, 717	79, 421	564, 734
1939.....	201, 736	45, 427	105, 024	109, 593	112, 880	9, 487	584, 147
1940.....	256, 955	31, 910	93, 653	153, 900	121, 672	6, 024	664, 114
1941.....	281, 632	29, 903	122, 599	899, 162	100, 552	100, 000	1, 533, 848
1942.....	273, 436	20, 208	123, 949	595, 451	52, 624	91, 100	1, 156, 768

In order to show the relationship of the projects recommended for construction in 1942 to the development plans and programs of the construction agencies, there are presented in the following notes brief explanatory data on the principal features of the projects recommended for construction in 1942, the estimated additional expenditures required to complete such projects in the years after 1942, and the recommended program for 1942 in relation to the agencies' six-year program.²

¹ These expenditures include: (1) "emergency" expenditures for public works from allotments to the construction agencies (Class I) from work-relief funds, but do not include expenditures from allotments to States, municipalities, and other non-Federal public bodies; and (2) construction expenditures of the Inland Waterways Corporation and the Panama Railroad and Steamship Lines, both of which operate outside the Budget. Also, figures shown for years prior to 1941 are actual. Figures for 1941 and 1942 are estimated.

² The programs of the Inland Waterways Corporation and the Panama Railroad and Steamship Lines are omitted from Table No. I, since estimates of their programs for 1942 are not available. These agencies operate outside the Budget, but they are designated as construction agencies (Class I).

Legislative Establishment

Architect of the Capitol

The major work recommended during the fiscal year 1942 consists of major repairs to the Capitol Building and grounds, including the completion of the reconstruction of the roofs over the Senate and House wings of the Capitol Building. Also, some reconstruction at the Library of Congress is involved. These projects comprise part of a continuing program for reconstructing and rebuilding the structures included in the Capitol Building group, in order to maintain them in constant good condition and to replace worn or outmoded equipment.

Botanic Garden

The work recommended for the fiscal year 1942 includes construction of additional greenhouses and other improvements at the Poplar Point Nursery. This is one item in a small construction program maintained by this agency.

Independent Offices and Establishments

National Advisory Committee for Aeronautics

Work will be carried on in installing new equipment and research facilities at Langley Field, Virginia, and at Moffett Field, Calif., as well as in completing the construction of the new airplane engine research laboratory at Cleveland, Ohio. The construction program of the Committee is one of the largest of the research agencies. Facilities at Moffett Field and at Cleveland, Ohio, that are recommended for construction during the fiscal year 1942 will also require additional estimated expenditures of \$1,561,000 thereafter in order to complete the projects.

Smithsonian Institution

As the part of the program for improving the buildings under the Institution's jurisdiction, construction involving \$73,000 is recommended for fiscal year 1942 at the Freer Gallery of Art for the installation of a temperature and humidity control plant.

Tennessee Valley Authority

The program during 1942 involves the continuation of construction on the program of major unified system projects, including Cherokee Dam and Reservoir and Watts Bar Steam Plant, both of which were initiated early in the fiscal year 1941 as special defense projects. The total required to complete this program in the fiscal years after 1942 is \$86,500,000. Substantial amounts of work yet remain to be done on the Ken-

tucky Dam, Hales Bar Dam, Fort Loudoun Dam, and Cherokee Dam. Of these, the greatest amount of work is necessary at the Kentucky and Fort Loudoun Dams, these two projects together requiring a little more than \$75,000,000 in the years following 1942 in order to complete them. Other construction work recommended for the Authority includes the continuation of the program for the installation of transmission and other electric plant and for construction of fertilizer plants.

Thomas Jefferson Memorial Commission

An expenditure of \$75,000 is recommended for the fiscal year 1942, which expenditure will practically complete the construction of the Memorial. The estimated cost of the Memorial is \$3,000,000, so that, after the fiscal year 1942, possibly an expenditure of \$42,000 may be required to complete the minor construction details in and about the Memorial and its surrounding grounds.

U. S. Maritime Commission

As a part of the training program now being undertaken by the Commission, construction work is recommended at the Avery Point Training Station. This project is one of several in the Commission's program which looks toward the establishment of training stations at key points on the Atlantic and Pacific coasts.

Veterans' Administration

The program for the fiscal year 1942 is divided between (1) construction providing additional beds and (2) major conditioning replacements, alterations, and new construction at existing Veterans' facilities. Prominent among the projects in the former part of the Administration's program are the completion of the new hospital at Fort Howard, Md., the construction of an additional hospital at Canandaigua, N. Y., and a new hospital in the Massachusetts-Rhode Island area. The major reconditioning and replacements at existing facilities comprise a large variety of miscellaneous construction, ranging in cost from \$35,000 to \$150,000. No additional expenditures will be required after 1942 to complete such of the projects as are recommended for construction during the fiscal year 1942. The current program of the Veterans' Administration contains projects that are available for construction after 1942, the total cost of which is estimated at \$25,000,000.

Federal Security Administration

St. Elizabeths Hospital

The program consists of construction of continued treatment buildings, necessary storerooms, warehouses, laundries, etc., at the institution and the addition of various structures at the farm of the institution.

Federal Works Agency

Office of the Administrator

The expenditure of \$75,000,000 recommended for construction work covers that required to provide housing for persons engaged in national defense activities, under the authority of the Lanham Defense Housing Act (Public No. 849, 76th Cong.). This is an emergency program brought about by national defense needs rather than a long-term construction program.

Public Buildings Administration

The construction recommended consists of three major programs:

1. A continuation of the construction of public buildings outside the District of Columbia under the authorization of the acts of August 25, 1937, June 21, 1938, and June 27, 1940. The total authorizations contained in these acts amount to \$133,500,000. To date, \$104,000,000 has been made available through appropriations. The expenditures prior to the fiscal year 1942 for this program have totaled approximately \$86,000,000. The \$10,000,000 recommended for expenditure during the fiscal year 1942 will leave approximately \$37,500,000 required in the fiscal years thereafter in order to complete the construction of the buildings authorized in the program.

2. The second program consists of buildings inside the District of Columbia. Foremost among these projects are the completion of the West Central Heating Plant, continuation of construction on the General Accounting Office building, and the acquisition of a site for the State Department Annex building.

3. The third part of the program covers the expenditures required for the construction of housing units at locations on or near military establishments (under the authority of Public No. 781, 76th Cong.). Construction was begun through the transfer of \$45,700,000 from the War Department. This is an emergency program brought about by national defense needs rather than a long-term program.

Public Roads Administration ¹

The expenditure of \$1,000,000 recommended during the fiscal year 1942 is to continue the construction of highways on unappropriated and unreserved public lands under the provisions of the act of June 24, 1930. The recommended expenditure is a part of a continuing program, subject to the authorizations of the Congress, to provide public land highway facilities. No estimates are immediately available as to the total cost of a complete development program for public land highways.

¹ Recommended expenditures for the Federal aid highway system, secondary or feeder roads, and grade-crossing elimination are shown in Table No. II since they are regarded as expenditures of construction agencies (Class II).

Department of Agriculture

Office of Experiment Stations

The construction recommended includes miscellaneous small items and improvements at the Federal Experiment Station, Mayaguez, P. R. It is estimated that approximately \$33,600 will be required after the fiscal year 1942 in order to complete the program of improvements to be undertaken at this station.

Special Research Fund

The recommended expenditures include construction work at experiment stations at Ithaca, N. Y., and East Lansing, Mich. These are two items in a program involving a proposed expenditure, over a period of years, of about \$115,000.

Bureau of Animal Industry

The expenditure of \$12,000 that is recommended is for the construction of farm and laboratory buildings. This comprises one item of a small construction program totaling \$93,600 proposed by the Bureau.

Bureau of Dairy Industry

An expenditure of \$12,500 is recommended for the fiscal year 1942 to cover the construction of dairy farm buildings, laboratories, fences, and electric, water, and sewer systems. The recommended expenditure is one part of the small construction program of \$179,700 proposed by the Bureau.

Bureau of Plant Industry

The expenditure of \$17,000 that is recommended is for the construction of farm buildings, greenhouses, shop buildings, garages, and fences in connection with the work of the Bureau. This expenditure is one part of the construction program of \$2,275,000 proposed by the Bureau.

Bureau of Entomology and Plant Quarantine

The expenditure of \$7,000 recommended for the fiscal year 1942 is for the construction of field laboratories and various small buildings for the use of the Bureau in its administrative operations.

Conservation and Use of Agricultural Land Resources

The expenditure of \$449,000 that is currently recommended is for the completion of the construction and equipment of four regional research laboratories now under construction. The current estimates of the total cost of these laboratories is about \$7,800,000, though this estimate may be increased as additional equipment is required.

Beltsville Research Center

An expenditure of \$12,000 is recommended for the construction and improvement of roads at the Research

Center. This item is one part of a construction program of \$1,840,000 directed toward the completion of the general plan at Beltsville.

Forest Service

The recommended construction program is divided into two parts:

1. The first provides for continuing the construction of a system of forest highways and of forest development roads and trails under the authorizations of the Congress. It is currently estimated that the total cost of completing the proposed system of national forest highways is \$636,000,000, of which approximately \$163,000,000 will have been spent prior to the fiscal year 1942; \$6,900,000 is recommended for the fiscal year 1942; and \$466,100,000 will be required in the years thereafter in order to complete the system in line with the proposed plans. The total estimated cost of the system of forest development roads and trails as proposed by the Forest Service is currently estimated at \$206,000,000, of which approximately \$75,000,000 will have been expended prior to the fiscal year 1942; \$29,000,000 is recommended for expenditure in 1942; and \$128,100,000 will be required in the fiscal years thereafter in order to complete the system in line with the proposed plans. Both of these programs will require many years for their completion.

2. The second part of the recommended Forest Service program includes the construction of buildings, structures, and other improvements for the administration and/or use of the national forests. This program includes a large number of items whose individual cost is less than \$7,500, which are scattered throughout the country. These structures and improvements are a part of a proposed program, totaling \$142,775,000, a large part of which, during the past few years, has been carried out with the cooperation of the Civilian Conservation Corps and the other work-relief agencies of the Government.

Soil Conservation Service.

Construction recommended for the fiscal year 1942 is divided among three types of work: (1) soil and moisture conservation "operations" projects with an expenditure of \$27,500; (2) soil and moisture conservation "research" projects with an expenditure of \$60,000; and (3) land utilization projects involving the construction of a dam with a recommended expenditure of \$250,000.

Farm Security Administration

The major construction recommended for the fiscal year 1942 is for additional migratory labor camps. The plans for these camps are not entirely complete, so that their exact location cannot as yet be given. These

projects are a continuation of the program of the Administration to provide these camps at the places where they are badly needed in order to deal with the migratory labor program.

Flood Control

Construction recommended for flood control activities is carried on in cooperation with the Army Corps of Engineers under the flood-control acts of 1936 and 1938, as amended. The Department of Agriculture is responsible for the development of a watershed program of run-off and water-flow retardation and of soil erosion prevention designed to mitigate flood damages. The full development of the projects in the construction program recommended for the fiscal year 1942 is estimated to cost \$9,000,000. In addition to this construction work, the Department, in its flood-control activities on these watersheds, is also concerned with various types of land improvement and protection work involving non-construction activities on these same projects totaling \$31,000,000. These projects are only one part of a proposed flood-control program now being initiated by the Department, which, as currently estimated, will total in its ultimate development \$325,000,000. A major part of the flood control improvement work is carried out by the Soil Conservation Service and the Forest Service. Other agencies of the Department, though not assuming direct responsibility, play an important part in carrying out the remedial measures for the respective water projects.

Department of Commerce

National Bureau of Standards

The two projects recommended include a materials testing laboratory and the replacing, with a new building and equipment, of the station for broadcasting standard frequencies now located at Beltsville, Md. These two projects are a part of a building program to provide research facilities for the Bureau totaling approximately \$2,500,000.

Coast and Geodetic Survey

Construction recommended for 1942 consists of major repairs at the observatory at Sitka, Alaska. This project is part of a program of \$500,000 proposed by the Survey.

Office of the Administrator of Civil Aeronautics

The program as recommended for 1942 is comprised of two parts:

1. The construction and improvement of air navigation facilities for the Federal airway system. This program, involving a recommended expenditure of

\$4,294,700 during 1942, covers several different types of projects, such as the construction of beacons, traffic control systems, radio communication and radio range stations, the installation of lighting equipment, and the enlargement and improvement of existing intermediate landing fields on the Federal airway system in the United States and Alaska. The program for 1942 represents a part of a larger program now being developed by the Administration for the further establishment of air navigation facilities. The rapid growth of air transportation in this country has made difficult the advanced programming of air navigation facilities and of the establishment and improvement of landing fields and airports.

2. The second part of the program is the construction, improvement, and repair of airports and other public landing areas in continental United States, its territories and possessions. This involves a recommended expenditure of \$40,000,000 in 1942. The program, which was initiated through appropriations first made available under the First Supplemental Civil Functions Appropriation Act of 1941, is an emergency one and was made necessary by the expanding defense program and the civilian training program. For some time, the Civil Aeronautics Administration has been studying the problem of developing an adequate system of airports and landing fields in the United States. These studies have been a continuation of the studies made and first reported upon to the Congress by the Civil Aeronautics Administration in January 1939. Surveys for the location of the airports to be selected for this program are currently under way.

Department of the Interior

Bonneville Power Administration

The program as recommended for 1942 is only a part of the larger proposed program for the agency, which ultimately looks toward the interconnection of the Government's major power projects in the Pacific Northwest. Some of the projects recommended for 1942, particularly those in the transmission system of 230-kilovolt lines, were inaugurated through defense appropriations made early in the fiscal year 1941. The present program of the Administration looks toward an expenditure of approximately \$61,000,000 for the 230-kilovolt transmission system and approximately \$22,000,000 for the 115-kilovolt system over the next 6 years. Executive Order No. 8526, dated August 26, 1939, providing for the integration and coordination of the Grand Coulee generating facilities with those at Bonneville, may require some extensions in the Administration's program as now proposed.

Bureau of Indian Affairs

Recommended expenditures during 1942 cover four types of activities: (1) the construction, repair, and rehabilitation of irrigation systems on the Indian reservations; (2) the construction and improvement of Indian reservation roads; (3) the construction, repair, and rehabilitation of buildings and utilities in the various agencies, schools, and hospitals maintained by the Bureau; and (4) the construction, extension, equipment, and improvement of public school facilities in cooperation with public school districts in the State of Minnesota.

It is estimated that in addition to the recommended expenditure of \$1,232,000 for the construction of irrigation systems during the fiscal year 1942, approximately \$31,384,000 will be required in the years thereafter in order to complete these projects. Outstanding among the major projects that will require considerable sums after 1942 in order to complete them are the Colorado River project, the Navajo Reservation project, and the Wapato Dam at the Yakima Reservation.

Outstanding among the projects involved in the construction of buildings and utilities for the Indian Service is the sanatorium at Tacoma, Wash. A complete program for the development of buildings and facilities for the Bureau of Indian Affairs, with estimates as to the total cost of projects included in such a program, is not available.

Bureau of Reclamation

Construction expenditures recommended for 1942 fall into five general groups:

1. *Those that will be financed from the reclamation fund.*—Outstanding among these are the Gila project in Arizona, the Colorado-Big Thompson project in Colorado, the Provo River project in Utah, and the Anderson Ranch Reservoir (Boise project) in Idaho. Following the fiscal year 1942, approximately \$111,900,000 will be required to complete those projects for which expenditures have been recommended for 1942. Outstanding among these larger projects is the Colorado-Big Thompson project which, in its ultimate development, will involve a total cost of \$54,288,000. Three sections of this project, the Green Mountain Dam and power plant, the Continental Divide tunnel, and the Granby Dam and reservoir, will be under construction in 1942, the balance going under construction during the following fiscal years.

2. *Those projects financed from the general fund of the Treasury.*—These include two large projects: Central Valley, which consists of six different project units, and the Columbia Basin project (Grand Coulee Dam). An expenditure of \$25,000,000 is recommended for 1942 for Central Valley, with an additional expenditure of \$134,838,000 required thereafter to complete the project, and an expenditure of \$10,000,000 is recommended

for 1942 for Grand Coulee, with an expenditure of \$289,093,000 required thereafter to complete the project. The dam itself will be essentially completed during the fiscal year 1942, and after that, work will be initiated on the upper reservoir and the pumping and distribution systems. Also, an expenditure of \$2,000,000 is recommended to undertake the Valley Gravity Canal and Storage project along the Rio Grande in Texas. This project will cost ultimately \$54,600,000.

3. *Those projects constructed from advances to the Colorado River Dam fund.*—These consist of two main projects, the All-American Canal System and the installation of additional generating facilities at Boulder Dam. In addition to the expenditures recommended for 1942 on the All-American Canal, an expenditure of \$32,493,000 will be required thereafter to complete the project.

4. *The Great Plains projects.*—Work will be continued through 1942 on the projects previously undertaken, and an additional expenditure of \$1,735,000 will be required after 1942 to complete five of the projects located in Montana, Nebraska, North Dakota, and Wyoming.

5. *Those projects undertaken under the Wheeler-Case Act, as amended.*—These include a large number of small projects that are being constructed from advances made to these projects from the general fund of the Treasury (such advances being repayable) and by work-relief activities under the Work Projects Administration. Studies that were made by the National Resources Committee through its Northern Great Plains Committee provided, in large measure, the basis upon which the final plan for undertaking these projects was developed. The projects are essentially designed to rehabilitate the lands they affect, as well as to provide work-relief employment during the period of their construction.

Bureau of Mines

The item of construction recommended involves the construction of an electric furnace laboratory building in the Tennessee Valley. This project is a part of a proposed construction program of the Bureau totaling about \$500,000.

National Park Service

Construction recommended covers three types of work: (1) The construction, repair, or rehabilitation of buildings on areas administered by the Park Service; (2) the construction of roads and trails in national parks, monuments, and other areas administered by the Park Service; and (3) continuing the construction of the Natchez Trace and Blue Ridge parkways and

the initiation of construction on the George Washington Memorial Parkway.

The Park Service has a proposed program for the construction of buildings and utilities looking toward an ultimate expenditure of \$65,000,000 in order to carry out the development plans for the areas under its administration. This program is built in terms of one or more unit developments within each park or monument area, and the program is so planned as to provide for a developing plan, insofar as construction is concerned, for each unit area. A large part of this work has gone forward during recent years with the cooperation of the Civilian Conservation Corps and the Work Projects Administration.

Under current authorizations of the Congress, the roads and trails development of the Park Service will require a total over-all expenditure of approximately \$120,600,000, of which about \$95,600,000 will have been spent prior to 1942 and about \$22,000,000 will be required in the years after 1942.

The three parkways for which construction expenditures are recommended in 1942 will require an expenditure of \$43,900,000 to complete them in the years thereafter. These parkways are being built in sections in accordance with a prearranged plan, so that parts of them may be made available for the public use without requiring the completion of the entire parkway system.

Fish and Wildlife Service

A large part of the construction operations necessary for the improvement and establishment of wildlife refuges has been undertaken by the various work-relief agencies. Consequently, expenditures that are recommended for the fiscal year 1942 are relatively small, although these expenditures may be increased by reason of work-relief projects or the cooperation of the Civilian Conservation Corps.

The proposed program of development for the Fish and Wildlife Service currently consists of more than \$7,900,000, of which \$5,600,000 is for wildlife protection and preservation and \$2,300,000 is for the establishment, improvement, and extension of fish cultural stations.

Alaska Road Commission

Projects recommended for 1942 are a part of the present program of the Commission, totaling \$12,000,000. This program may, of necessity, be increased at a later date either because of the defense requirements in Alaska or because of the influx of population that is anticipated by reason of the placing of new military and naval establishments in the Territory.

Alaska Railroad

Construction work recommended consists largely of the replacing of wooden bridges with steel bridges and

the construction or improvement of station buildings along the railroad. Depending upon the national defense requirements in the Territory, additional roadway improvements, realignment, and general improvements may be necessary to care for increased traffic in future years.

Government of the Virgin Islands

An expenditure of \$12,165 is recommended for the fiscal year 1942 for the improvement and alteration of buildings and highways under the jurisdiction of the Government of the Islands. This is a part of a program of current construction undertaken by the Government which recently has been financed largely from emergency relief funds.

Puerto Rico Reconstruction Administration

The expenditure of \$8,000 that is recommended for the fiscal year 1942 is for the completion of the construction of farmers' houses on the Islands. Additional expenditures for 1942 may be recommended later depending upon supplemental appropriations, since the construction work of the Administration has recently been financed largely from emergency relief funds, and in later years has been as large as \$2,500,000.

Department of Justice

Bureau of Prisons

Construction recommended for 1942 consists of extensions of facilities at existing penal and correctional institutions. The proposed program for future years for new institutions is estimated at approximately \$21,000,000, and the program proposed for extensions at existing institutions is \$7,000,000.

Navy Department

Bureau of Yards and Docks

The program of construction as recommended for 1942 provides for the continuation of construction on projects begun during the fiscal year 1941 or previously, and for projects to be placed under construction during the fiscal year 1942. In the case of the former projects, an expenditure of \$216,000,000 is recommended for the fiscal year 1942. For the latter projects, an expenditure of \$44,500,000 will be required during the fiscal year 1942 and \$38,000,000 to complete them in the years thereafter.

The full program for the Bureau of Yards and Docks, as considered by the Shore Station Development Board this year, comprises approximately \$590,000,000 of which \$83,000,000 is recommended for construction for the first time during 1942.

Department of State

Office of the Secretary.

The expenditure of \$500,000 that is recommended for the fiscal year 1942 is for the Trans-Isthmian Highway. This is an emergency program undertaken because of the defense situation and has been inaugurated through allotments made by the President from national-defense emergency funds.

Foreign Service Buildings Office

Continuation of projects previously undertaken is recommended for the fiscal year 1942, as well as the inauguration of new projects, largely at foreign service posts in Latin America. These projects are part of a program approved by the Foreign Service Buildings Commission and authorized by acts of the Congress. No program is available to indicate the relationship of the projects recommended for 1942 to the proposed work for future years.

International Boundary Commission, U. S. and Mexico

Construction recommended for 1942 includes continuing the work on the Lower Rio Grande Flood Control project and the Rio Grande Canalization project.

The proposed program for the years following 1942 totals \$20,000,000.

Treasury Department

Coast Guard

The program of construction that is recommended for the fiscal year 1942 can be divided into two parts: first, those projects that involve the construction of additional shore facilities, and, second, those projects that involve the establishment or improvement of aids to navigation. Outstanding among the former is the construction at the Avery Point Training Station.

The program of aids to navigation has among its larger items the construction of light stations and the establishment of naval defense aids to navigation in Alaskan waters and in the Pacific islands. The latter projects are required by the expansion of national defense operations in those areas.

The foregoing projects are a part of a complete construction program of the Coast Guard, which proposes the construction of projects costing \$38,500,000.

War Department

Office of the Secretary

The expenditure of \$64,000,000 recommended for the fiscal year 1942 covers the construction of emergency housing for persons on or near military posts and for the construction of industrial plants in order to expedite the manufacture of armaments. No estimates are im-

mediately available as to the ultimate cost of the construction of such industrial plants. This is an emergency program brought about by the defense situation, rather than being a part of a long-term Government construction program.

Quartermaster Corps

Like the program for the Bureau of Yards and Docks, the program of construction for the Quartermaster Corps for the fiscal year 1942 is divided between (1) the expenditures recommended to continue those projects placed under construction by reason of appropriations made available prior to the fiscal year 1942, and (2) those projects recommended to be placed under construction through appropriations to be made available for the first time in the fiscal year 1942. The work involved in the continuation of construction projects previously started is, in large measure, devoted to the construction of cantonments, reception centers, etc., in order to care for the increased strength of the Army under the Selective Service Act of 1940. A complete program of army construction for future years is not available at this time, in as much as the requirements of national defense may change the magnitude of the program and the proposed location of such works as may be involved.

Signal Corps

The expenditure of \$402,000 that is recommended for the fiscal year 1942 covers the construction of buildings, including appurtenances thereto, and roads. This is a part of an emergency defense program to provide facilities for the Corps.

Seacoast Defenses

The expenditure of \$37,811,000 that is recommended for the fiscal year 1942 is for the construction of various types of fortifications along the seacoasts of the country. This is, in large measure, an emergency program brought about by the defense situation.

Corps of Engineers

River and Harbor Improvements.—Construction recommended includes, among the larger projects, the work around New York Harbor, the Sabine-Neches Waterway, Tex., the Mississippi River between the Missouri River and Minneapolis, and the Missouri River from Kansas City to Sioux City, Iowa. To complete the projects that are recommended for construction in 1942 will require a total expenditure of \$85,500,000 in the years thereafter. Apart from these projects, the proposed program of authorized river and harbor improvements for the years after 1942 totals \$75,000,000.

Flood Control.—The program of construction recommended for 1942 involves an expenditure of \$80,000,000. Outstanding among the projects on which construction will be continued in 1942 are the Dennison Reservoir in Texas and Oklahoma; the Canton Reservoir in the Arkansas River Basin, Okla.; the Blue Stone Reservoir, W. Va.; and flood control work on the Los Angeles River, Calif. The total estimated cost in the complete program of authorized flood control projects upon which construction during 1942 is not recommended but which will be available for construction in later years is estimated to be about \$275,000,000.

Mississippi River Flood Control.—The recommended expenditure for 1942 is \$25,000,000. The total cost of the entire works in the alluvial valley is estimated to be \$637,000,000, of which \$420,000,000 will have been spent prior to 1942 and approximately \$191,000,000 will be required in the years thereafter in order to complete the work. This large system of control works involves expenditures at many points in the valley, and the total estimated cost of the work may be increased as the program is ultimately developed, depending upon future authorizations of the Congress.

Power Plant Installations.—Expenditures are recommended for installations at Fort Peck Dam and at the Bonneville Dam. It is estimated that approximately \$6,500,000 will be required in the years after 1942 to complete the installation of the units now under construction at Bonneville.

Sacramento River Flood Control.—An expenditure of

\$300,000 is recommended for dredging channels, building levees, bank protection, etc.

Panama Canal

Outstanding among the projects recommended for the Panama Canal in 1942 is the continuation of the construction of a third set of locks. The total estimated cost of these locks is approximately \$277,000,000. An expenditure of \$30,000,000 is recommended for the fiscal year 1942, and approximately \$237,000,000 will be required in the years thereafter to complete these additional facilities. In addition, improvements, replacements, and reconstruction of other works and facilities in the Canal Zone totaling \$7,170,000 are recommended for the fiscal year 1942. These include such things as school buildings, offices, water supply systems, hospitals, special protective works, etc.

District of Columbia Government

An expenditure of \$7,500,000 is recommended for general public works construction in the District of Columbia during the fiscal year 1942. These works will be constructed under the administration of the District Government and will be financed partly through a contribution from the Federal Government to the funds of the District. The projects comprise all types of public works construction necessary for a modern city government and include streets, schools, government buildings, etc.

FEDERAL SIX-YEAR PROGRAM OF PUBLIC WORKS

TABLE NO. I.—*Projects recommended for fiscal year 1942*

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
	LEGISLATIVE ESTABLISHMENT				
	Architect of the Capitol:				
	Reconstruction of roofs over Senate and House chamber wings in the Capitol Building.....	\$585,000	\$125,000	\$460,000	
	Reconstruction and repair of the Capitol Building terraces and the space underneath.....	365,000		365,000	
	Reconstruction of plaza driveways including sewer work.....	390,000		390,000	
	Air conditioning and structural and other improvements in the book stacks, Main Building, Library of Congress.....	500,000		500,000	
	Elimination of fire hazards, Library of Congress.....	68,012		68,012	
	Total, Architect of the Capitol.....	1,908,012	125,000	1,783,012	
	Botanic Garden:				
	Construction of additional greenhouses and other improvements, Poplar Point Nursery....	90,000		90,000	
	Total, Botanic Garden.....	90,000		90,000	
	INDEPENDENT OFFICES AND ESTABLISHMENTS				
	National Advisory Committee for Aeronautics:				
(2)	Langley Memorial Aeronautical Laboratory, Langley Field, Va.: Construction and equipment.....	1,350,463	650,463	700,000	
	Total, Langley Field.....	1,350,463	650,463	700,000	
(2)	Ames Aeronautical Laboratory, Moffett Field, Calif.: Construction and equipment.....	5,670,000	1,209,000	3,700,000	\$761,000
	Total, Moffett Field.....	5,670,000	1,209,000	3,700,000	761,000
(2)	Airplane Engine Research Laboratory, Cleveland, Ohio: Construction and equipment of new laboratory buildings.....	8,000,000	1,700,000	5,500,000	800,000
	Total, Cleveland Laboratory.....	8,000,000	1,700,000	5,500,000	800,000
	Total, National Advisory Committee for Aeronautics.....	15,020,463	3,559,463	9,900,000	1,561,000
(2)	Smithsonian Institution: Installation of mechanical equipment, Freer Gallery of Art.....	73,000		73,000	
	Total, Smithsonian Institution.....	73,000		73,000	
	Tennessee Valley Authority:				
	Major unified system projects:				
2100-31-1	Kentucky Dam and Reservoir.....	105,000,000	31,135,909	17,000,000	56,864,091
2100-31-2	Pickwick Landing Dam and Reservoir.....	35,760,687	34,780,687	873,000	107,000
2100-31-3	Wilson Dam and Reservoir.....	36,192,221	34,018,221	1,789,000	385,000
2100-31-4	Wheeler Dam and Reservoir.....	35,770,136	35,751,136	8,000	11,000
2100-31-5	Guntersville Dam and Reservoir.....	31,605,425	31,677,425	17,000	11,000
2100-31-6	Hales Bar Dam and Reservoir.....	7,000,000	817,816	1,747,000	4,435,184
2100-31-7	Chickamauga Dam and Reservoir.....	34,791,836	84,127,836	633,000	31,000
2100-31-8	Watts Bar Dam and Reservoir.....	35,000,000	22,946,014	10,608,000	1,545,986
2100-31-9	Fort Loudoun Dam and Reservoir.....	29,000,000	2,478,595	5,925,000	20,596,405
2100-31-10	Hiwassee Dam and Reservoir.....	17,384,619	17,312,619	12,000	60,000
2100-31-11	Norris Dam and Reservoir.....	30,937,348	30,899,348	21,000	17,000
2100-31-12	Cherokee Dam and Reservoir.....	34,500,000	15,224,000	16,825,000	2,451,000
2100-31-13	Watts Bar steam plant.....	10,000,000	5,467,000	4,557,000	124,000
	Total, major unified system projects.....	442,942,272	296,536,606	59,915,000	86,490,666
	Transmission and other electric plant:				
(2)	Normal program.....	48,587,291	36,622,291	6,868,000	5,097,000
(2)	Emergency program.....	16,530,000	3,936,000	6,454,000	6,140,000
(2)	Bond fund program.....	63,768,965	62,133,965	1,635,000	0
	Total, transmission and other electric plant.....	128,886,256	102,692,256	14,957,000	11,237,000
(2)	Miscellaneous construction: Fertilizer plant, Muscle Shoals, Ala. and vicinity of Columbia, Tenn.....	9,224,441	7,117,441	823,000	1,284,000
	Total, miscellaneous.....	9,224,441	7,117,441	823,000	1,284,000
	Total, Tennessee Valley Authority.....	581,052,969	406,346,303	75,695,000	99,011,666
(2)	Thomas Jefferson Memorial Commission: Construction of memorial, District of Columbia.....	3,000,000	2,883,000	75,000	42,000
	Total, Thomas Jefferson Memorial Commission.....	3,000,000	2,883,000	75,000	42,000
(2)	U. S. Maritime Commission: Construction of training stations: Buildings, Point Avery, Conn.....	750,000		750,000	
	Total, U. S. Maritime Commission.....	750,000		750,000	
	Veterans' Administration:				
2000-14-1	Construction providing additional beds:				
2000-31-1	Canandaigua, N. Y., construction providing 164 additional N. P. beds.....	350,000		350,000	
2000-86-1	Fort Howard, Md., erection of new hospital, central heating plant, extension of services to existing facilities.....	925,000	822,000	103,000	
	Massachusetts-Rhode Island area, construction of new 300-beds G. M. Hospital.....	1,575,000	28,000	1,547,000	
	Total, construction providing additional beds.....	2,850,000	850,000	2,000,000	

1 Credit.

1 Blanket project consisting of several items. No docket number assigned.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
INDEPENDENT OFFICES AND ESTABLISHMENTS—Continued					
Veterans' Administration—Continued.					
Major reconditioning, replacements, alterations, and new construction at existing facilities:					
2000-9-1	Bedford, Mass., dining hall and kitchen, Building No. 7.....	\$35,000		\$35,000	
2000-12-2	Bronx, N. Y., addition to laundry, including equipment.....	35,000		35,000	
2000-12-1	Bronx, N. Y., alterations to existing buildings.....	200,000	\$100,000	100,000	
2000-13-1	Camp Custer, Mich., alterations to kitchen and dining hall, Building No. 5.....	35,000		35,000	
2000-18-1	Cleveland, Ohio, manager's and duplex quarters.....	49,000		49,000	
2000-21-2	Danville, Ill., water softener and distribution lines.....	50,000		50,000	
2000-21-1	Danville, Ill., alterations to building No. 15.....	65,000		65,000	
2000-22-1	Dayton, Ohio, garage building.....	50,000		50,000	
2000-22-2	Dayton, Ohio, replacement of pump house and reservoir.....	35,000		35,000	
2000-25-1	Downey, Ill., dining hall and kitchen building No. 9.....	35,000		35,000	
2000-35-1	Hines, Ill., continuation of renovation of main building.....	352,000	200,000	152,000	
2000-43-1	Legion, Tex., operating suite.....	45,000		45,000	
2000-47-1	Los Angeles, Calif., guard house.....	40,000		40,000	
2000-47-2	Los Angeles, Calif., completion of mess improvements, building No. 13.....	100,000	60,000	40,000	
2000-47-3	Los Angeles, Calif., dining hall, building No. 116.....	60,000		60,000	
2000-47-5	Los Angeles, Calif., alterations to diet kitchen and main kitchen in Wadsworth Hospital for centralized tray service.....	50,000		50,000	
2000-53-1	Marion, Ind., underground electric distribution system.....	30,000		30,000	
2000-54-1	Mountain Home, Tenn., alterations barracks No. 1.....	50,000		50,000	
2000-57-1	Muskogee, Okla., continued alterations, hospital buildings.....	127,500	62,500	65,000	
2000-57-2	North Little Rock, Ark., space for regional office activities.....	90,000		90,000	
2000-57-2	North Little Rock, Ark., recondition nurses' quarters.....	30,000		30,000	
2000-60-1	Outwood, Ky., diet kitchens and connecting corridors.....	60,000		60,000	
2000-61-1	Palo Alto, Calif., replacement of sewer outfall.....	35,000		35,000	
2000-72-1	St. Cloud, Minn., addition to subsistence building.....	75,000		75,000	
2000-79-1	Wadsworth, Kans., recondition buildings Nos. 7, 8, and 14.....	105,000		105,000	
2000-79-2	Wadsworth, Kans., complete reconditioning hotel and theater building No. 63.....	35,000		35,000	
2000-83-1	White River Junction, Vt., manager's and duplex quarters.....	49,000		49,000	
	Total, at existing Veterans' facilities.....	1,922,500	422,500	1,500,000	
	Total, Veterans' Administration.....	4,772,500	1,272,500	3,500,000	
Federal Security Agency:					
1108-49-1	Continued treatment buildings, St. Elizabeths Hospital, Washington, D. C.....	700,000		400,000	\$300,000
1108-49-2	Storeroom, warehouse, laundry, and industrial shops, St. Elizabeths Hospital, Washington, D. C.....	635,000		300,000	335,000
1108-49-3	Farm land, dairy, barns, poultry houses, smokehouse, and cottages within 20 miles of St. Elizabeths Hospital, Washington, D. C.....	785,000		200,000	585,000
	Total, St. Elizabeths Hospital.....	2,120,000		900,000	1,220,000
	Total, Federal Security Agency.....	2,120,000		900,000	1,220,000
Federal Works Agency:					
(1)	Office of the Administrator: Construction of housing for persons engaged in national defense activities (Public, No. 849, 76th Cong.).....	140,000,000	65,000,000	75,000,000	
	Total, Office of the Administrator.....	140,000,000	65,000,000	75,000,000	
(1)	Public Buildings Administration: Construction of public buildings outside District of Columbia: Construction of, and acquisition of sites for, public buildings outside of the District of Columbia.....	\$ 133,500,000	86,000,000	10,000,000	37,500,000
	Total, public buildings outside District of Columbia.....	133,500,000	86,000,000	10,000,000	37,500,000
	Construction of public buildings within District of Columbia:				
	First unit, War Department buildings.....	9,800,000	8,800,000	1,000,000	
	Sites and buildings, Federal office buildings Nos. 2 and 3.....	6,400,000	5,000,000	1,400,000	
1201-49-1	Site and building, West Central Heating Plant.....	3,900,000	1,400,000	2,200,000	300,000
1201-49-2	Site and building, General Accounting Office.....	9,850,000	1,700,000	4,500,000	3,650,000
1201-49-4	Annex buildings, Government Printing Office.....	7,700,000	7,500,000	200,000	
	Extension and remodeling, Bureau of Agricultural Economics Building.....	1,600,000		700,000	900,000
	Acquisition of land.....	\$ 700,000		600,000	100,000
1201-49-3	Site, State Department Annex Building.....	\$ 920,000		800,000	120,000
1201-49-5	Changes, remodeling, installation of mechanical equipment, National Archives Building.....	849,700		800,000	49,700
	Total, public buildings, within District of Columbia.....	41,719,700	24,400,000	12,200,000	5,119,700
(1)	Construction of housing units at locations on or near military establishments (Public, No. 781, 76th Cong., transferred from the Office of the Secretary of War.....	45,700,000	33,500,000	12,200,000	
	Total, defense housing units.....	45,700,000	33,500,000	12,200,000	
	Total, Public Buildings Administration.....	220,919,700	143,900,000	34,400,000	42,619,700
(4)	Public Roads Administration: Construction of roads through unappropriated or unreserved public lands, nontaxable Indian lands, or Federal reservations other than the forest reservations.....	\$ 1,000,000	(2)	1,000,000	(2)
	Total, Public Roads Administration.....			1,000,000	
	Total, Federal Works Agency.....	361,919,700	208,900,000	110,400,000	42,619,700

1 No docket numbers yet assigned to the individual projects.

2 Authorized limit of costs in acts of Aug. 25, 1937, June 21, 1938, and June 27, 1940.

3 Estimates of construction costs for buildings to be placed on such sites not yet available.

4 Bracket project consisting of several items. No docket number assigned.

5 No estimates immediately available of total cost.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF AGRICULTURE					
812-54-5	Office of Experiment Stations: Construction and improvements to land, Federal experiment station, Mayaguez, P. R.	\$40,100	-----	\$6,500	\$33,600
	Total, Office of Experiment Stations	40,100	-----	6,500	33,600
803-30-2	Special Research Fund: United States regional plant, soil, and nutrition laboratory, Ithaca, N. Y. (construction of greenhouse and extension of head house)	25,000	-----	25,000	-----
802-20-1	United States regional poultry research laboratory, East Lansing, Mich. (additions to west breeding house)	12,000	-----	12,000	-----
	Total, special research fund	37,000	-----	37,000	-----
(1)	Bureau of Animal Industry: Construction of farm and laboratory buildings	12,000	-----	12,000	-----
	Total, Bureau of Animal Industry	12,000	-----	12,000	-----
(1)	Bureau of Dairy Industry: Construction of miscellaneous buildings	12,500	-----	12,500	-----
	Total, Bureau of Dairy Industry	12,500	-----	12,500	-----
(1)	Bureau of Plant Industry: Construction of buildings, greenhouses, etc.	17,000	-----	17,000	-----
	Total, Bureau of Plant Industry	17,000	-----	17,000	-----
(1)	Bureau of Entomology and Plant Quarantine: Construction of field laboratories, etc.	7,000	-----	7,000	-----
	Total, Bureau of Entomology and Plant Quarantine	7,000	-----	7,000	-----
(1)	Conservation and Use of Agricultural Land Resources: Construction and equipment of four regional research laboratories	7,800,000	\$7,351,000	449,000	-----
	Total, Conservation and Use of Land Resources	7,800,000	7,351,000	449,000	-----
(1)	Beltsville Research Center: Construction and improvement of roads	12,000	-----	12,000	-----
	Total, Beltsville Research Center	12,000	-----	12,000	-----
805-318-2	Forest Service: Construction of forest highways	636,028,635	162,910,235	6,900,000	466,218,400
	Total, forest highways	636,028,635	162,910,235	6,900,000	466,218,400
805-318-2	Construction of forest development roads and trails	206,439,382	75,279,281	2,900,000	128,260,101
	Total, roads and trails	206,439,382	75,279,281	2,900,000	128,260,101
(1)	Construction of buildings, structures and other improvements for the administration and/or use of the national forests	591,000	-----	591,000	-----
	Total, structures in national forests	591,000	-----	591,000	-----
	Total, Forest Service	843,059,017	238,189,516	10,391,000	594,478,501
808-32-1	Soil Conservation Service: Soil and moisture conservation "operations" projects:	5,000	-----	5,000	-----
808-36-1	Office and field laboratory, Mandan, N. Dak.	5,000	-----	5,000	-----
808-14-2	Office and field laboratory, Milesburg, Pa.	5,000	-----	5,000	-----
808-36-2	Garage, Manhattan, Kans.	5,000	-----	5,000	-----
808-14-1	Residence, Milesburg, Pa.	7,500	-----	7,500	-----
	Residence, Manhattan, Kans.	7,500	-----	7,500	-----
	Total, "operations"	27,500	-----	27,500	-----
808-30-1	Soil and Moisture conservation "research" projects:	15,000	-----	15,000	-----
808-23-1	Office and laboratory building, Marcellus, N. Y.	15,000	-----	15,000	-----
808-11-1	Office and laboratory building, McCredie, Mo.	15,000	-----	15,000	-----
808-9-1	Office and laboratory building, Dixon Springs, Ill.	15,000	-----	15,000	-----
	Office and laboratory building, Watkinsville, Ga.	15,000	-----	15,000	-----
	Total, "research"	60,000	-----	60,000	-----
808-29-1	Land utilization and retirement of submarginal land projects: Impounding dam, Running Water Draw Project, Clovis, Curry County, N. Mex.	353,640	33,900	250,000	69,740
	Total, land utilization	353,640	33,900	250,000	69,740
	Total, Soil Conservation Service	441,140	33,900	337,500	69,740
(1)	Farm Security Administration: Rural rehabilitation projects:	250,000	-----	250,000	-----
	Land development and minor construction work	2,850,000	-----	2,850,000	-----
(2)	Migratory labor camps: Construction of additional standard camps	2,850,000	-----	2,850,000	-----
	Total, Farm Security Administration	3,100,000	-----	3,100,000	-----

¹ Blanket project consisting of a number of individual items. No docket number assigned.
² No docket numbers yet assigned to the individual projects.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF AGRICULTURE—Continued					
Flood control:					
Construction costs for improvement works for run-off and water-flow retardation measures and soil erosion prevention on watersheds of flood control projects:					
809-108-1	Los Angeles River, Calif.....	\$2,500,000	\$125,000	\$315,000	\$2,060,000
809-95-1	Trinity River, Tex.....	8,379,635	688,575	721,425	6,969,635
809-86-1	Washita River, Okla. and Tex.....	3,500,000	100,000	150,000	3,250,000
809-91-1	Little Tallahatchie River, Miss.....	31,895,724	621,956	849,044	30,424,724
809-26-1	Coosa River, Ga. and Tenn.....	1,050,000	75,000	75,000	900,000
		2,319,520	203,810	206,100	1,819,520
		950,000	30,000	120,000	800,000
		1,734,253	60,000	190,000	1,484,253
		1,000,000	15,000	125,000	860,000
		1,916,514	79,560	260,440	1,576,514
	Total, flood control.....	9,000,000	345,000	785,000	7,870,000
	Total, Department of Agriculture.....	863,537,757	245,919,416	15,166,500	602,451,841
DEPARTMENT OF COMMERCE					
National Bureau of Standards:					
903-49-1	Materials Testing Laboratory, Washington, D. C.....	600,000		600,000	
	Replacement of station for broadcasting standard frequencies, Washington, D. C.....	240,000		240,000	
	Total, National Bureau of Standards.....	840,000		840,000	
Coast and Geodetic Survey:					
901-50-1	New construction and major repairs at magnetic and seismological observatory, Sitka, Alaska.....	21,500		3,900	17,600
	Total, Coast and Geodetic Survey.....	21,500		3,900	17,600
Office of the Administrator of Civil Aeronautics:					
Construction of new Federal airways to provide facilities for additional scheduled operations:					
904-17-1	Bangor-Caribou.....	19,000		19,000	
904-32-1	Bismark-Minot.....	66,300		66,300	
904-20-1	Grand Rapids-Traverse City.....	23,400		23,400	
904-23-1	St. Louis-Des Moines.....	64,700		64,700	
904-23-2	St. Louis-Louisville.....	38,700		38,700	
	Total, new Federal airways.....	212,100		212,100	
904-0-1	Installation of fan markers for traffic control, etc., at key points on existing airways.....	406,000		175,000	231,000
	Total, fan markers.....	406,000		175,000	231,000
904-0-2	Construction of Z markers at key points near existing major airports.....	245,000		70,000	175,000
	Total, Z markers.....	245,000		70,000	175,000
Construction of simultaneous radio range and broadcast station:					
904-45-3	Cape Flattery, Wash.....	50,000		50,000	
	Total, range and broadcast station.....	50,000		50,000	
Construction of airport radio landing systems:					
904-0-5	Oakland, Calif.....	30,000		30,000	
	Atlanta, Ga.....	30,000		30,000	
	Total, radio landing systems.....	60,000		60,000	
904-50-1	Establishment of radio range stations in Alaska:				
	Boundary.....	200,000		200,000	
	Total, Alaska radio range stations.....	200,000		200,000	
904-50-2	Establishment of radio communication stations in Alaska:				
	Anchorage.....	60,000		60,000	
	Total, Alaska radio communication stations.....	60,000		60,000	
904-50-3	Construction of ML radio stations at fields on Alaska airways:				
	Petersburg.....	60,000		60,000	
	Haines (or Skagway).....	70,000		70,000	
	Yakutat.....	60,000		60,000	
	Copper Center.....	70,000		70,000	
	Summit.....	60,000		60,000	
	Tanana.....	70,000		70,000	
	Moses Point.....	60,000		60,000	
	Iliamna.....	80,000		80,000	
	Seward.....	60,000		60,000	
	Tanana Crossing.....	80,000		80,000	
	King Cove.....	70,000		70,000	
	Total, Alaska ML radio stations.....	740,000		740,000	
904-50-4	Construction of intermediate fields on Alaska Airways:				
	Copper Center.....	70,000		70,000	
	Tanana Crossing.....	70,000		70,000	
	Naknek.....	70,000		70,000	
	Petersburg (or Wrangell).....	100,000		100,000	
	Haines (or Skagway).....	100,000		100,000	
	Seward.....	100,000		100,000	

¹ Construction costs for improvement works for run-off and water retardation measures and soil erosion prevention on watersheds with flood-control projects.

² Estimated total costs of flood control in the watersheds by the Department of Agriculture. These amounts are not included in the totals of the table.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF COMMERCE—Continued					
Office of the Administrator of Civil Aeronautics—Continued.					
Construction of intermediate fields on Alaska Airways—Continued.					
	King Cove.....	\$100,000		\$100,000	
	Chignik.....	100,000		100,000	
	Total, Alaska intermediate fields.....	710,000		710,000	
904-50-5	Install lighting equipment at intermediate fields on Alaska Airways:				
	Moses Point.....	25,000		25,000	
	Yakataga.....	25,000		25,000	
	Talkeetna.....	25,000		25,000	
	Summit.....	25,000		25,000	
	Tanana.....	30,000		30,000	
	Farwell.....	30,000		30,000	
	Lake Minchumina.....	30,000		30,000	
	Petersburg (or Wrangell).....	25,000		25,000	
	Haines (or Skagway).....	25,000		25,000	
	Seward.....	25,000		25,000	
	Iliamna.....	30,000		30,000	
	Aniak.....	30,000		30,000	
	Copper Center.....	25,000		25,000	
	Tanana Crossing.....	30,000		30,000	
	Naknek.....	25,000		25,000	
	Chignik.....	25,000		25,000	
	King Cove.....	25,000		25,000	
	Total, lighting Alaska fields.....	455,000		455,000	
904-0-7	Enlargement and improvement of existing intermediate landing fields on Federal airways system, and construction of hard-surface runways:				
	Anniston, Ala.....	90,600		90,600	
	Anthony, Kans.....	53,200		53,200	
	Ardmore, Okla.....	68,200		68,200	
	Brinkley, Ark.....	47,300		47,300	
	Daggett, Calif.....	59,400		59,400	
	Elmira, N. Y.....	52,000		52,000	
	Evergreen, Ala.....	45,100		45,100	
	Kirksville, Mo.....	55,700		55,700	
	Laramie, Wyo.....	106,900		106,900	
	Livermore, Calif.....	49,100		49,100	
	Livingston, Mont.....	69,900		69,900	
	Morse, Ill.....	35,000		35,000	
	New Florence, Mo.....	58,200		58,200	
	Newhall, Calif.....	57,400		57,400	
	Oceanside, Calif.....	41,100		41,100	
	Palmdale, Calif.....	58,400		58,400	
	Tucumcari, N. Mex.....	76,200		76,200	
	Vickery, Ohio.....	73,500		73,500	
	Williams, Calif.....	56,100		56,100	
	Yoakum, Tex.....	61,300		61,300	
	Fields to be selected later.....	300,000		300,000	
	Total, improving intermediate fields on Federal airways.....	1,514,600		1,514,600	
904-0-9	Miscellaneous improvements to lighting facilities, relocation of beacons, etc., on Federal Airways:				
	El Paso-Fort Worth.....	48,000		48,000	
	Total, miscellaneous improvements to lighting facilities.....	48,000		48,000	
(1)	Washington National Airport:				
	Construction of hangars and necessary appurtenances.....	2,700,000	\$1,600,000	1,100,000	
	Total, Washington National Airport.....	2,700,000	1,600,000	1,100,000	
(2)	Construction, improvement and repair of public airports for defense purposes.....	73,500,000	25,000,000	40,000,000	\$8,500,000
	Total, construction of airports.....	73,500,000	25,000,000	40,000,000	8,500,000
	Total, Office of Administrator of Civil Aeronautics.....	80,900,700	26,600,000	45,394,700	8,906,000
	Total, Department of Commerce.....	81,782,200	26,600,000	46,238,600	8,923,600
DEPARTMENT OF THE INTERIOR					
Bonneville Power Administration:					
Transmission system of 230-kilovolt lines:					
711-45-1	Grand Coulee-Covington, Wash., No. 1 line.....	4,471,000	2,741,000	1,730,000	
711-45-2	Bonneville-North Vancouver, Wash., No. 3 line.....	1,515,000	296,000	1,219,000	
711-45-3	Covington-Seattle, Wash.....	300,000	232,000	68,000	
711-45-7	Substation construction and additions at various points.....	5,554,900	1,600,000	3,954,900	
	Total, 230-kilovolt transmission system.....	11,840,900	4,869,000	6,971,900	
Transmission system of 115-kilovolt lines:					
711-45-8	St. Johns-Oregon City, Oreg., No. 2 line.....	255,960	2,960	253,000	
711-45-9	Substation construction or additions at various points.....	848,000		848,000	
	Total, 115-kilovolt transmission system.....	1,103,960	2,960	1,101,000	
711-45-10	Feeder lines, service connections to load areas, industrial customers, etc.....	2,000,000	500,000	1,500,000	
	Total, feeder lines, etc.....	2,000,000	500,000	1,500,000	
	Total, Bonneville Power Administration.....	14,944,860	5,371,960	9,572,900	

¹ Blanket project consisting of a number of individual items. No docket number assigned ;
² No docket numbers yet assigned to all the individual projects.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF THE INTERIOR—Continued					
Bureau of Indian Affairs:					
Construction, repair and rehabilitation of irrigation systems on Indian reservations:					
706-8-1	Colorado River.....	\$14,022,911	\$5,772,911	\$110,000	\$8,140,000
706-35-1	Navajo Reservation.....	6,385,719	2,643,426	255,000	3,887,293
706-17-1	Salt River Reservation.....	1,815,360	1,310,360	40,000	465,000
706-34-1	Mission Agency, Southern California, miscellaneous projects.....	844,658	874,658	8,000	162,000
706-52-2	Sacramento Agency, northern and central California, miscellaneous projects.....	621,239	220,739	26,700	373,800
706-52-1	Owens Valley.....	261,148	235,948	10,000	15,200
706-16-1	Flathead.....	9,927,480	9,352,480	250,000	325,000
706-18-1	Fort Belknap.....	715,300	428,300	6,250	280,750
706-21-1	Fort Peck.....	4,078,779	1,325,879	25,000	2,727,900
706-2-3	Carson.....	228,233	61,733	17,000	149,500
706-77-1	Western Shoshone.....	1,181,381	703,951	25,000	452,430
706-2-2	Walker River.....	431,291	383,791	5,000	42,500
706-2-1	Pyramid Lake.....	507,227	346,227	125,000	36,000
706-74-1	Pueblos, miscellaneous.....	4,634,985	3,375,985	60,000	1,199,000
706-76-1	Warm Springs.....	121,935	49,935	5,000	67,000
706-80-1	Yakima (Wapato).....	17,483,192	5,783,192	210,000	11,490,000
706-78-1	Wind River.....	3,780,061	2,343,881	10,000	1,426,180
706-0-1	Various States, miscellaneous garden tracts and stock water development.....	1,129,375	639,375	45,000	445,000
	Total, irrigation projects.....	68,170,274	35,552,771	1,232,950	31,384,553
706-0-3	Construction, improvement, etc., of Indian reservation roads.....	27,600,000	17,750,000	2,000,000	7,750,000
	Total, Indian roads.....	27,600,000	17,750,000	2,000,000	7,750,000
Construction, repair or rehabilitation of buildings and utilities:					
Alaska:					
706-81-2	3-classroom school and quarters, Kaki.....	12,000		12,000	
706-81-2	Teacherage, Walaklut.....				
706-1-2	Blackfeet, Mont.: Farm agent's dwelling.....	7,500		7,500	
706-8-3	Colorado River, Ariz.: Farm dwellings.....	14,000		14,000	
706-13-4	Crow Creek, S. Dak.: Utility system improvement.....	28,000		28,000	
706-13-1	Quarters.....	14,000		14,000	
706-13-3	Warehouse.....	3,600		3,600	
706-13-5	Remodel school.....	10,000		10,000	
706-13-5	School shop building.....				
706-13-5	General repairs.....				
706-16-3	Flathead, Mont.: Improvements to water and sewer system.....	13,000		13,000	
706-17-2	Fort Apache: Dining hall, laundry, baking and kitchen facilities, Theodore Roosevelt School.....	28,000		28,000	
706-19-1	Fort Berthold, N. Dak.: Improvements to power system.....	22,000		22,000	
706-19-2	Dwelling for farm agent.....	7,500		7,500	
706-26-1	Hoopa Valley, Calif.: Improvements to utilities.....	25,000		25,000	
706-27-2	Hopi, Ariz.: Improvements to utilities.....	24,000		24,000	
706-31-1	Klamath, Oreg.: Employees' quarters.....	15,000		15,000	
706-35-2	Navajo, Ariz.: Headquarters buildings at 2 stations.....	35,000		35,000	
706-43-3	Pima, Ariz.: Employees' quarters.....	9,000		9,000	
706-48-1	Red Lake, Minn.: Employee's cottage.....	7,500		7,500	
706-61-1	Sherman Institute, California: Improvements to utilities.....	25,000		25,000	
706-65-1	Tacoma Sanatorium, Washington: Completion of sanatorium.....	895,000		895,000	
706-76-2	Warm Springs, Oreg.: Employees' quarters.....	15,000		15,000	
706-79-1	Winnebago, Nebr.: Employees' quarters.....	29,900		29,900	
	Total, construction of buildings and utilities.....	1,240,000		1,240,000	
Construction, extension, equipment, and improvement of public school facilities in cooperation with public school districts in the State of Minnesota:					
	Independent school district No. 5, Cass County.....	\$65,000		\$65,000	
	Naytahwaush, Indian school district No. 29, Mahnommen County.....	19,000		19,000	
	Inger, district No. 6, Itaska County.....	7,000		7,000	
	Lake Lena, district No. 2, Pine County.....	12,500		12,500	
	Vermillion Lake, tower, Soudan district, St. Louis County.....	7,000		7,000	
	Beaulieu, unorganized district, Mahnommen County.....	12,500		12,500	
	Jack Pine, unorganized district, Clearwater County.....	7,000		7,000	
	Nett Lake, unorganized district, St. Louis, Koochiching Counties.....	37,500		37,500	
	Pine Point, unorganized district, Becker County.....	3,000		3,000	
	Squaw Point, unorganized district, Cass County.....	15,000		15,000	
	Total, construction of schools in Minnesota.....	185,500		185,500	
	Total, Bureau of Indian Affairs.....	97,095,774	53,302,771	4,658,450	39,134,553
Bureau of Reclamation:					
Reclamation Projects, Payable from Reclamation Fund:					
702-103-7	Gila project, Arizona.....	20,500,000	7,610,000	850,000	12,040,000
702-105-1	Modoc unit, Klamath project, California-Oregon.....	884,000	180,000	200,000	504,000
702-102-1	Colorado-Big Thompson project, Colorado.....	54,288,000	7,681,000	3,500,000	43,107,000
702-110-2	Payette division, Boise project, Idaho.....	8,847,000	4,454,000	700,000	3,693,000
702-81-1	Tucumcari project, New Mexico.....	8,155,000	796,000	425,000	6,934,000
702-112-1	Deschutes project, Oregon.....	7,430,000	1,572,000	450,000	5,408,000

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditures for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF THE INTERIOR—Continued					
Bureau of Reclamation—Continued:					
Reclamation Projects, Payable from Reclamation Fund—Continued:					
702-110-4	Owyhee project, Oregon.....	\$18,500,000	\$18,190,000	\$140,000	\$170,000
702-104-1	Provo River project, Utah.....	16,129,000	5,043,000	1,800,000	9,286,000
702-111-1	Roza Division, Yakima project, Washington.....	18,085,000	11,739,000	400,000	5,946,000
702-72-1	Kendrick project, Wyoming.....	20,000,000	18,381,000	300,000	1,319,000
702-67-4	Riverton project, Wyoming.....	9,466,000	6,118,000	20,000	3,325,000
702-67-3	Heart Mountain division, Shoshone project, Wyoming.....	6,509,000	4,153,000	280,000	2,067,000
702-102-8	Pacola project, Colorado.....	994,000	9,000	250,000	735,000
702-110-1	Anderson Ranch Reservoir, Boise project, Idaho.....	13,100,000	522,000	850,000	11,728,000
702-66-1	Sun River project, Montana.....	9,500,000	9,029,143	60,000	410,857
702-100-1	Carlsbad (supplemental) project, New Mexico.....	2,500,000	2,410,000	55,000	35,000
702-85-1	Altus project, Oklahoma.....	5,568,000	282,000	250,000	5,036,000
702-102-2	Uncompahgre project, Colorado.....	2,600,000	2,417,000	80,000	102,000
702-104-3	Ogden River project, Utah.....	4,426,000	4,288,000	130,000	8,000
702-67-6	Shoshone power division, Wyoming.....	300,000	-----	250,000	50,000
702-67-5	Shoshone-Willwood division, Wyoming.....	1,127,000	1,060,000	20,000	47,000
702-110-3	Orlando project, Calif.....	35,000	17,000	18,000	-----
-----	Minidoka project, Idaho.....	600,000	450,000	150,000	-----
-----	Humboldt project, Nev.....	100,000	95,000	5,000	-----
-----	Rio Grande project, N. M. and Calif.....	2,085,000	1,615,000	450,000	-----
-----	Total, reclamation fund.....	231,699,000	108,111,143	11,633,000	111,954,857
Reclamation Projects Payable from General Fund:					
702-103-6	Parker Dam power project, Arizona-California.....	14,860,000	7,282,000	6,000,000	1,578,000
702-106-1	Central Valley project, California.....	228,010,000	68,172,000	25,000,000	134,838,000
702-97-1	Marshall Ford Dam, Colorado River project, Texas.....	23,780,000	22,780,000	1,000,000	-----
702-111-2	Columbia Basin project (Grand Coulee Dam), Washington.....	435,734,000	136,641,000	10,000,000	289,093,000
702-101-1	San Luis Valley project, Colorado.....	17,887,000	140,000	100,000	17,647,000
702-66-2	Fort Peck Power project, Montana-North Dakota.....	5,050,000	-----	450,000	4,600,000
702-102-6	Pine River project, Colorado.....	1,800,000	1,700,000	100,000	-----
104-41-5	Valley Gravity Canal and Storage project, Texas.....	54,600,000	-----	2,000,000	52,600,000
-----	Total, general fund.....	781,721,000	236,715,000	44,650,000	500,356,000
Advances to Colorado River dam fund:					
702-103-1	All-American Canal System, California.....	65,000,000	30,507,000	2,000,000	32,493,000
702-103-5	Boulder Dam and power plant, Boulder Canyon project, Arizona-California-Nevada.....	140,000,000	129,408,000	6,800,000	4,092,000
-----	Total, Colorado River Dam fund.....	205,000,000	159,915,000	8,800,000	36,585,000
Great Plains projects:¹					
702-67-1	First division, Buffalo Rapids project, Montana.....	330,000	212,000	118,000	-----
702-67-2	Second division, Buffalo Rapids project, Montana.....	740,000	495,000	125,000	120,000
702-70-1	Mirage Flats project, Nebraska.....	985,000	320,000	335,000	330,000
702-68-2	Buford-Trenton project, North Dakota.....	630,000	220,000	210,000	200,000
702-68-1	Blismarck project, North Dakota.....	250,000	180,000	70,000	-----
702-102-7	Eden project, Wyoming.....	1,300,000	200,000	330,000	770,000
-----	Projects to be selected later.....	765,000	100,000	350,000	315,000
-----	Total, Great Plains.....	5,000,000	1,727,000	1,538,000	1,735,000
Projects under Wheeler-Casa Act:²					
702-102-9	Mancos project, Colorado.....	600,000	200,000	300,000	100,000
702-104-2	Newton project, Utah.....	215,000	100,000	100,000	15,000
702-69-2	Rapid Valley project, South Dakota.....	1,100,000	200,000	350,000	550,000
-----	Projects to be selected later.....	5,085,000	473,000	1,712,000	2,900,000
-----	Total, Wheeler-Casa Act.....	7,000,000	973,000	2,462,000	3,565,000
-----	Total, Bureau of Reclamation.....	1,230,420,000	507,441,143	68,783,000	654,195,857
Bureau of Mines:					
705-40-1	Construction of electric furnace laboratory building, Norris, Tenn.....	10,000	-----	10,000	-----
-----	Total, Bureau of Mines.....	10,000	-----	10,000	-----
National Park Service:					
Construction and rehabilitation of buildings and utilities:					
707-20-2	Ski lodge completion at Paradise, Mount Rainier National Park, Wash.....	5,000	-----	5,000	-----
707-20-3	Completion of campers' shelter and blockhouse, Mount Rainier National Park, Wash.....	12,000	-----	12,000	-----
707-28-1	Utilities development, Yosemite Valley, Yosemite National Park, Calif.....	15,000	-----	15,000	-----
707-20-1	Dormitory and mess hall, Narada Falls area, Mount Rainier National Park, Wash.....	16,500	-----	16,500	-----
707-20-2	Community building alterations at Paradise, Mount Rainier National Park, Wash.....	12,000	-----	12,000	-----
707-28-1	Utility services to Tecoya residence extension, Yosemite Valley, Yosemite National Park, Calif.....	22,900	-----	22,900	-----
707-42-1	Electric generating unit at monument headquarters, Bandelier National Monument, New Mexico.....	2,000	-----	2,000	-----
707-27-1	Electrical system, Canyon area, Yellowstone National Park, Wyo.....	110,000	-----	60,000	50,000
707-27-2	Comfort station in museum, Mammoth area, Yellowstone National Park, Wyo.....	9,000	-----	9,000	-----
707-18-1	Water-supply line, Mesa Verde National Park, Colo.....	75,000	-----	75,000	-----
707-107-1	Heating plant and underground utilities, Statue of Liberty National Monument, New York.....	20,000	-----	20,000	-----
707-107-1	General landscape development, Statue of Liberty National Monument, New York.....	25,000	-----	3,000	22,000
707-3-4	Water system at Rainbow Point, Bryce Canyon National Park, Utah.....	5,100	-----	5,100	-----
707-64-1	Completion of comfort station, Fort Jefferson National Monument, Florida.....	1,600	-----	1,600	-----
707-15-1	Two employees' residences, Grant Grove section, Kings Canyon National Park, Calif.....	16,000	-----	16,000	-----
-----	Total, buildings and utilities.....	347,000	-----	275,000	72,000

¹ Department of Agriculture costs are not included in the total estimated costs.² WPA and CCC costs are not included in the total estimated cost.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF THE INTERIOR—Continued					
National Park Service—Continued:					
Parkways:					
707-175-1	Natchez Trace Parkway (Tennessee, Alabama, Mississippi).....	\$34,709,099	\$6,390,499	\$1,600,000	\$26,718,600
707-173-1	Blue Ridge Parkway (Virginia, North Carolina).....	38,538,473	20,670,473	3,650,000	14,218,000
707-174-1	George Washington Memorial Parkway (Virginia).....	4,998,400	1,282,529	750,000	2,965,871
	Total, parkways.....	78,245,972	28,343,501	6,000,000	43,902,471
Roads and trails:					
707-0-1	Construction, reconstruction, and improvement of roads and trails in national parks, monuments, etc.....	120,615,327	95,615,327	3,000,000	22,000,000
	Total, park roads and trails.....	120,615,327	95,615,327	3,000,000	22,000,000
	Total, National Park Service.....	199,208,299	123,958,828	9,275,000	65,974,471
Fish and Wildlife Service:					
Mammal and bird reservations:					
(1)	Structures and improvements.....	125,000		125,000	
	Total, mammal and bird reservations.....	125,000		125,000	
Migratory bird conservation:					
(1)	Structures and improvements.....	38,000		38,000	
	Total, migratory bird.....	38,000		38,000	
Repairs, alterations, and improvements at fish cultural stations:					
	Miles City station, Montana, water supply and pond.....	3,000		3,000	
	Total, improvements at fish cultural stations.....	3,000		3,000	
708-45-4	Construction of fish screens: Fish screens and ladders in irrigation works, Washington, Oregon, Idaho, and Montana.....	805,700	363,200	11,500	431,000
	Total, fish screens.....	805,700	363,200	11,500	431,000
708-50-7	Repairs, alterations, improvements, etc., Alaska fisheries service: Construction of four additional salmon-counting weirs.....	55,000		5,000	50,000
708-50-4	Replacing water mains on St. Paul and St. Georges Islands, Alaska.....	12,000		12,000	
	Total, improvements, Alaska fisheries.....	67,000		17,000	50,000
708-47-3	Upper Mississippi River fish refuge: Fish cultural ponds.....	170,000	10,000	10,000	150,000
	Total, upper Mississippi refuge.....	170,000	10,000	10,000	150,000
	Total, Fish and Wildlife Service.....	1,208,700	373,200	204,500	631,000
Alaska Road Commission:					
	Construction of roads, bridges, and trails in Alaska.....	76,000		76,000	
	Total, Alaska Road Commission.....	76,000		76,000	
Alaska Railroad:					
Roadway and structures:					
712-50-3	Ballast and patch ballast roadbed.....	100,400		100,400	
712-50-4	Riprap at points on line.....	29,300		29,300	
	Purchase and place culvert pipe.....	20,000		20,000	
	Replace wooden bridge mile 267.7 with steel.....	60,000		60,000	
	Replace wooden bridge mile 270.0 with steel.....	55,000		55,000	
	Replace wooden bridge mile 347.4 with steel.....	54,300		54,300	
	Fill bridge mile 352.8.....	7,500		7,500	
	Station and office building, Anchorage.....	200,000		200,000	
	Water station cache, improvement.....	2,000		2,000	
	Water station standard.....	15,000		15,000	
	Messhouse, Willow.....	6,500		6,500	
	Dormitory, Broad Pass.....	15,000		15,000	
	Dormitory, Garner.....	8,000		8,000	
	Depot, Broad Pass.....	6,500		6,500	
	Marine ways, Nenana.....	7,200		7,200	
712-50-13	Inclinator, McKinley Park.....	3,500		3,500	
	Total, Alaska Railroad.....	590,200		590,200	
Government of the Virgin Islands:					
(1)	Improvements and alterations in buildings, highways, etc.....	12,165		12,165	
	Total, Government of the Virgin Islands.....	12,165		12,165	
Puerto Rico Reconstruction Administration:					
(1)	Construction of farmers' houses.....	8,000		8,000	
	Total, Puerto Rico Reconstruction Administration.....	8,000		8,000	
	Total, Department of the Interior.....	1,543,573,998	690,447,902	93,190,215	759,935,881
DEPARTMENT OF JUSTICE					
Bureau of Prisons:					
Extensions to facilities of the existing institutions:					
401-0-1	McNeil Island, Wash.....	70,000		70,000	
	Atlanta, Ga.....	47,500		47,500	
	Lewisburg, Pa.....	11,200		11,200	
	Leavenworth, Kans. (main).....	12,000		12,000	
	Alderson, W. Va.....	22,300		22,300	

¹ Blanket project consisting of several items. No docket number assigned.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
DEPARTMENT OF JUSTICE—Continued					
Bureau of Prisons—Continued.					
Extensions to facilities of the existing institutions—Continued.					
	Chillicothe, Ohio.....	\$27,500		\$27,500	
	El Reno, Okla.....	17,500		17,500	
	Petersburg, Va.....	25,000		25,000	
	Washington, D. C. (training school).....	100,000		100,000	
	Springfield, Mo.....	25,000		25,000	
	Denver, Colo.....	5,000		5,000	
	La Tuna, Texas.....	31,000		31,000	
	Milan, Mich.....	8,000		8,000	
	Sandstone, Minn.....	12,500		12,500	
	Tallahassee, Fla.....	30,000		30,000	
	Texarkana, Texas.....	5,000		5,000	
	Prison camps (Montgomery).....	1,250		1,250	
	Total, Bureau of Prisons.....	450,750		450,750	
	Total, Department of Justice.....	450,750		450,750	
NAVY DEPARTMENT					
Bureau of Yards and Docks:					
Projects placed under construction under appropriations available prior to June 30, 1941.....					
		1 216,008,660		216,008,660	
Total, prior to June 30, 1941.....					
		1 216,008,660		216,008,660	
Projects to be placed under construction during the fiscal year 1942:					
601-9	Navy Yard, Boston, Mass.....	420,000		280,000	\$140,000
601-19	Navy Yard, Charleston, S. C.....	210,000		160,000	50,000
601-46	Navy Yard, Mare Island, Calif.....	500,000		340,000	160,000
601-69	Navy Yard, Norfolk, Va.....	800,000		480,000	320,000
601-32	Navy Yard, Pearl Harbor, Hawaii.....	6,776,500		2,372,500	4,404,000
601-66	Navy Yard, Philadelphia, Pa.....	260,000		260,000	
601-72	Navy Yard, Portsmouth, N. H.....	375,000		275,000	100,000
601-74	Navy Yard, Puget Sound, Wash.....	6,705,000		3,690,000	3,015,000
601-93	Navy Yard, Washington, D. C.....	475,000		260,000	215,000
601-31	Naval station, Guam.....	1,437,500		825,000	612,500
601-23	Naval station, Guantanamo, Cuba.....	170,000		110,000	60,000
601-79	Naval station, Tutuila, Samoa.....	250,000		215,000	35,000
601-71	Naval station, Olongapo, P. I.....	150,000		150,000	
601-61	Naval operating base, Norfolk, Va.....	3,150,000		1,675,000	1,475,000
601-16	Submarine base, Coco Solo, C. Z.....	706,000		490,000	216,000
601-56	Submarine base, New London, Conn.....	51,000		51,000	
601-32	Submarine base, Pearl Harbor, Hawaii.....	360,000		200,000	160,000
601-82	Destroyer base, San Diego, Calif.....	1,510,000		910,000	600,000
601-4	Naval Academy, Annapolis, Md.....	1,360,000		830,000	530,000
601-29	Naval training station, Great Lakes, Ill.....	260,000		260,000	
601-65	Naval training station, Newport, R. I.....	750,000		400,000	350,000
601-61	Naval training station, Norfolk, Va.....	35,000		35,000	
601-80	Fleet training base, San Clemente Island, Calif.....	550,000		300,000	250,000
601-33	Naval ammunition depot, Hawthorne, Nev.....	1,995,000		1,493,000	502,000
601-27	Naval ammunition depot, Fort Mifflin, Pa.....	643,000		393,000	250,000
601-34	Naval ammunition depot, Hingham, Mass.....	304,000		234,000	70,000
601-36	Naval ammunition depot, Iona Island, N. Y.....	128,000		128,000	
601-47	Naval ammunition depot, Mare Island, Calif.....	348,000		268,000	80,000
601-32	Naval ammunition depot, Oahu, Hawaii.....	815,000		695,000	120,000
601-75	Naval ammunition depot, Puget Sound, Wash.....	112,000		112,000	
601-73	Naval ammunition depot, St. Juliens Creek, Va.....	482,000		412,000	70,000
	East coast ammunition depot.....	3,759,000		1,600,000	2,259,000
601-39	Naval torpedo station, Keyport, Wash.....	45,000		45,000	
601-97	Naval mine depot, Yorktown, Va.....	100,000		100,000	
601-24	Naval proving grounds, Dahlgren, Va.....	70,000		70,000	
601-4	Naval hospital, Annapolis, Md.....	485,000		210,000	275,000
601-9	Naval hospital, Chelsea, Mass.....	250,000		175,000	75,000
601-60	Naval hospital, Norfolk, Va.....	285,000		285,000	
601-74	Naval hospital, Puget Sound, Wash.....	250,000		250,000	
601-1	Naval air station, Alameda, Calif.....	300,000		200,000	100,000
601-2	Naval air station, Anacostia, D. C.....	100,000		100,000	
601-16	Naval air station, Coco Solo, C. Z.....	474,000		330,000	144,000
601-98	Naval air station, Jacksonville, Fla.....	2,753,500		1,603,500	1,150,000
601-37	Naval air station, Johnston Island.....	168,500		100,000	68,500
601-32	Naval air station, Kaneohe Bay, Hawaii.....	1,347,846		750,000	597,846
601-41	Naval air station, Kodiak, Alaska.....	1,015,000		715,000	300,000
601-49	Naval air station, Midway Island.....	741,783		400,000	341,783
601-61	Naval air station, Norfolk, Va.....	300,000		200,000	100,000
601-102	Naval air station, Palmyra Island.....	168,500		100,000	68,500
601-32	Naval air station, Pearl Harbor, Hawaii.....	2,985,765		1,870,000	1,115,765
601-65	Naval air station, Pensacola, Fla.....	1,100,000		510,000	590,000
601-84	Naval air station, San Juan, P. R.....	1,105,000		650,000	455,000
601-85	Naval air station, San Pedro, Calif.....	375,000		375,000	
601-86	Naval air station, Seattle, Wash.....	60,000		50,000	10,000
601-87	Naval air station, Sitka, Alaska.....	1,491,700		753,700	738,000
601-90	Naval air station, Unalaska.....	285,000		195,000	100,000
601-76	Marine Corps flying field, Quantico, Va.....	405,000		305,000	100,000
601-10	Naval Reserve aviation base, Quantico, Va.....	95,000		95,000	
601-61	Naval fuel depot annex (Crane Island) Norfolk, Va.....	977,500		602,500	375,000
601-82	Naval fuel depot, San Diego, Calif.....	680,000		420,000	260,000
601-71	Naval fuel depot, Sangle Point, P. I.....	65,000		65,000	
601-83	Naval supply depot, Oakland, Calif.....	8,500,000		4,000,000	4,500,000
601-32	Naval supply depot, Pearl Harbor, Hawaii.....	1,250,000		850,000	400,000
601-82	Naval supply depot, San Diego, Calif.....	230,000		230,000	
601-82	Marine Corps base, San Diego, Calif.....	1,205,000		855,000	350,000
601-63	Marine barracks, Parris Island, S. C.....	375,000		275,000	100,000
601-76	Marine barracks, Quantico, Va.....	987,000		687,000	300,000
601-60	Marine Corps depot of supplies, Philadelphia, Pa.....	700,000		400,000	300,000

¹ Includes only construction costs for which expenditures will be made during fiscal year 1942. Estimated total construction costs of the projects involved not immediately available.

TABLE NO. I.—*Projects recommended for fiscal year 1942—Continued*

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
NAVY DEPARTMENT—Continued					
Bureau of Yards and Docks—Continued.					
Projects to be placed under construction during the fiscal year 1942—Continued.					
601-83	Marine Corps depot of supplies, San Francisco, Calif.	\$600,000		\$300,000	\$300,000
	Eleventh naval district, San Diego, Calif.	1,225,000		800,000	425,000
	Fourteenth naval district, Pearl Harbor, Hawaii	6,266,000		1,766,000	4,500,000
	Fifteenth naval district, Canal Zone	7,500,000		3,000,000	4,500,000
	Total, during 1942	83,164,094		44,491,200	38,672,894
	Total, Bureau of Yards and Docks	299,172,754		260,499,860	38,672,894
	Total, Navy Department	299,172,754		260,499,860	38,672,894
DEPARTMENT OF STATE					
	Office of the Secretary:				
	Trans-Isthmian Highway	1 3,400,000	\$2,900,000	600,000	
	Total, Office of the Secretary	1 3,400,000	2,900,000	600,000	
	Foreign Service Buildings Office:				
	Residence and office for Minister, Canberra	225,000		150,000	75,000
	Legation residence, Pretoria	65,000		50,000	15,000
	Minister's residence and office, Quito	110,000		80,000	30,000
	Consular office and residence, Para	40,000		30,000	10,000
	Minister's residence and office, Asuncion	110,000		90,000	20,000
	Office building, Lima	40,000		40,000	
	Secretary's residence, Managua	35,000		35,000	
	Office building, Port-au-Prince	75,000		75,000	
	Total, Foreign Service Building Office	700,000		550,000	150,000
	International Boundary Commission, United States and Mexico:				
104-41-1	Rio Grande Rectification Project, El Paso Valley, Tex.	4,070,000	4,045,000	25,000	
104-41-2	Lower Rio Grande flood control project, along Rio Grande from Panitas, Tex., to the Gulf	9,390,000	6,610,000	1,000,000	1,780,000
104-41-3	Rio Grande canalization project, along Rio Grande from El Paso, Tex., to Caballo Dam in New Mexico	4,270,000	3,346,500	650,900	272,600
104-41-4	Rio Grande canalization bridge project, on Rio Grande between El Paso and Caballo Dam	350,000	310,000	40,000	
104-41-6	Cordova Island boundary fence project, near El Paso, Tex.	6,500		6,500	
	Total, International Boundary Commission	18,086,500	14,311,500	1,722,400	2,052,600
	Total, Department of State	22,186,500	17,211,500	2,772,400	2,202,600
TREASURY DEPARTMENT					
	Coast Guard:				
202-6-1	Construction of additional shore facilities:				
	Avery Point Training School, New London, Conn.	3,000,000		3,000,000	
	Primary radio station, Boston district	218,000		218,000	
	Total, shore facilities	3,218,000		3,218,000	
	Aids to navigation:				
(1)	Necessary because of extension and improvement of inland waterways	251,370		251,370	
(1)	Buoyage, for replacements, spares and extension of the buoyage system	155,200		155,200	
(1)	Modernization and extension of the system of radio beacons	45,500		45,500	
(1)	Renewal and modernization of fog signal equipment	37,000		37,000	
(1)	Structural repairs, renewals, and improvements	92,535		92,535	
(1)	Riprap stone protection for structures	53,500		53,500	
(1)	Shore protection work	15,000		15,000	
(1)	Electrification of aids to navigation and stations	61,710		61,710	
(1)	Modernization of housing facilities at stations	7,500		7,500	
202-50-4	Enlarge district office building, Ketchikan Base, Alaska	50,000		50,000	
202-50-5	Rebuild Cape Sarichef Light Station, Unimak Pass, Alaska	90,000		30,000	60,000
(1)	Establishment of national defense aids to navigation, Pacific Islands	204,835		204,835	
(1)	Extension and improvement of national defense aids to navigation in Alaskan waters	495,850		495,850	
	Total, aids to navigation	1,560,000		1,500,000	60,000
	Total, Coast Guard	4,778,000		4,718,000	60,000
	Total, Treasury Department	4,778,000		4,718,000	60,000
WAR DEPARTMENT					
	Office of the Secretary:				
(1)	Expediting production of supplies and equipment:				
	Construction of buildings, etc.	1 113,796,631	50,000,000	63,796,631	
	Total, expediting production	113,796,631	50,000,000	63,796,631	
(1)	National defense housing:				
	Construction of houses and facilities for defense employees	1 2,800,000	2,000,000	800,000	
	Total, defense housing	2,800,000	2,000,000	800,000	
	Total, Office of the Secretary of War	116,596,631	52,000,000	64,596,631	

¹ Blanket project consisting of a large number of individual items. No docket number assigned.

² Includes only construction costs for which expenditures will be made during fiscal years 1941 and 1942. Estimated total construction costs not immediately available.

³ Blanket project consisting of a large number of individual items. Docket numbers will be assigned to the projects later.

⁴ In addition, Public Buildings Administration is constructing \$45,700,000 of defense housing.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
WAR DEPARTMENT—Continued					
(1)	Quartermaster Corps: Construction of buildings, utilities, etc., at military posts.....	\$ 232, 440, 000	-----	\$232, 440, 000	-----
	Total, Quartermaster Corps.....	232, 440, 000	-----	232, 440, 000	-----
(1)	Signal Corps: Construction of buildings, roads, etc.....	\$ 402, 550	-----	402, 550	-----
	Total, Signal Corps.....	402, 550	-----	402, 550	-----
(2)	Seacoast Defenses: Construction of seacoast defenses.....	\$ 37, 811, 562	-----	37, 811, 562	-----
	Total, seacoast defenses.....	37, 811, 562	-----	37, 811, 562	-----
	Corps of Engineers:				
	River and harbor projects:				
302-5-2	Connecticut River below Hartford, Conn., regulating works.....	950, 010	\$740, 010	50, 000	\$160, 000
302-7-4	New York Harbor, N. Y., dredge anchorage areas and deepen channels.....	13, 300, 056	9, 051, 056	1, 662, 250	2, 586, 750
302-6-3	Great Lakes to Hudson River waterway, deepening to 14 feet and bridge alterations.....	27, 000, 039	21, 303, 039	700, 000	4, 997, 000
302-7-8	New York and New Jersey Channels, dredging and rock removal to enlarge channels.....	37, 629, 290	16, 119, 290	2, 350, 000	19, 160, 000
302-121-2	Arecibo Harbor, P. R., dredging and breakwaters.....	487, 000	468, 000	19, 000	-----
302-8-2	Inland waterway from Delaware River to Chesapeake Bay, Del. and Md., jetty extension, dredging, and bank stabilization.....	15, 088, 779	13, 053, 779	300, 000	1, 735, 000
302-29-1	Caloosahatchee River and Lake Okeechobee drainage areas, Fla., remove old locks and spillway in St. Lucie Canal.....	17, 649, 398	17, 609, 398	40, 000	-----
302-90-10	Southwest Pass and South Pass, Mississippi River, La., dredging and regulating works.....	25, 161, 267	24, 237, 267	490, 000	434, 000
302-94-1	Sabine-Naches waterway, Texas, Beaumont and Orange, Tex., to the Gulf of Mexico, enlarge channels and turning basins.....	12, 543, 853	9, 457, 353	1, 066, 500	2, 020, 000
302-90-13	Louisiana-Texas Intracoastal waterway, Sabine River to Corpus Christi, Tex., dredge 9-foot waterway.....	7, 920, 339	4, 377, 339	1, 000, 000	2, 543, 000
302-65-4	Mississippi River between Ohio and Missouri Rivers, regulating works.....	43, 000, 004	34, 600, 004	700, 000	7, 700, 000
302-54-2	Mississippi River between Missouri River and Minneapolis, locks, guard and gulch walls and miscellaneous work.....	169, 960, 339	148, 908, 339	4, 200, 000	16, 852, 000
302-60-17	Illinois waterway, Illinois, mouth of Illinois River to Chicago, Ill., dredging.....	30, 189, 509	25, 494, 509	350, 000	4, 345, 000
302-77-3	Missouri River, Kansas City to mouth, dredging and regulating works.....	79, 998, 834	75, 523, 834	1, 500, 000	2, 975, 000
302-71-1	Missouri River, Kansas City to Sioux City, Ia., dredging and regulating works.....	91, 999, 350	79, 767, 350	1, 700, 000	10, 532, 000
302-66-3	Missouri River, Fort Peck, Mont., earth dam.....	115, 950, 135	115, 030, 135	350, 000	570, 000
302-33-4	Ohio River, lock and dam construction, miscellaneous work at various structures.....	130, 849, 600	128, 789, 600	100, 000	1, 960, 000
302-33-5	Ohio River, open channel (dredging and bank protection).....	17, 048, 742	13, 212, 742	500, 000	3, 337, 000
302-44-1	Keweenaw waterway, Michigan (across Keweenaw Point), dredging and breakwaters.....	6, 626, 595	5, 943, 595	302, 000	381, 000
302-45-1	Sturgeon Bay and Lake Michigan Ship Canal, Wis., dredging.....	1, 200, 587	650, 587	275, 000	275, 000
302-47-3a	Cleveland Harbor, Ohio, dredging Cuyahoga River.....	6, 507, 823	6, 192, 123	200, 000	115, 700
302-47-8	Buffalo Harbor, N. Y., dredging outer harbor.....	3, 291, 209	2, 479, 209	202, 000	610, 000
302-106-1	San Francisco Harbor, Calif., rock removal and dredging main ship channel.....	1, 330, 801	1, 180, 801	150, 000	-----
302-113-8	Columbia River between Vancouver, Wash., and Bonneville, Oreg., dredging 27-foot channel.....	2, 849, 050	2, 306, 550	542, 500	-----
302-112-3	Columbia River at Bonneville, Oreg., lock and dam construction.....	41, 576, 839	41, 480, 589	47, 750	48, 500
302-112-2	Columbia River and tributaries above Celilo Falls to mouth of Snake River, Wash. and Oreg., dredging and rock removal.....	1, 474, 706	1, 044, 706	50, 000	350, 000
302-110-1	Snake River, Oreg., Wash. and Idaho, dredging, rock removal and snagging.....	882, 873	216, 573	50, 000	616, 000
302-1-5	Portland Harbor, Maine, rock removal.....	1, 790, 129	1, 578, 129	100, 000	112, 000
302-3-7	New Bedford and Fairhaven Harbor, Mass., dredging.....	1, 696, 758	1, 684, 758	12, 000	-----
302-5-3	Bridgeport Harbor, Conn., dredging Black Rock Channel.....	1, 257, 034	1, 216, 034	41, 000	-----
302-10-6	Baltimore Harbor and Channels, Md., complete dredging of York Spit section of channel.....	3, 265, 237	3, 215, 237	50, 000	-----
302-115-1	Neah Bay, Wash., south side of Strait of Juan de Fuca, breakwater.....	1, 500, 000	-----	800, 000	700, 000
302-45-3	Indiana Harbor, Indiana.....	4, 039, 918	3, 571, 918	100, 000	368, 000
	Projects previously under way.....	\$ 15, 000, 000	-----	15, 000, 000	-----
	Total, rivers and harbors.....	931, 017, 103	810, 504, 153	35, 000, 000	85, 512, 950
(4)	Flood Control Projects, general: Construction of levees, revetments and reservoirs.....	\$ 80, 000, 000	-----	80, 000, 000	-----
	Total, flood control projects, general.....	80, 000, 000	-----	80, 000, 000	-----
302-89-1	Mississippi River flood control projects: Mississippi River flood control in the Alluvial Valley, Ill., Ky., Mo., Tenn., Ark., Miss., and La.....	637, 000, 000	420, 153, 400	25, 000, 000	191, 846, 600
	Total, Mississippi River flood control.....	637, 000, 000	420, 153, 400	25, 000, 000	191, 846, 600
302-66-3	Power Installation projects: Missouri River at Fort Peck, Mont., hydroelectric plant.....	5, 845, 000	3, 000, 000	2, 845, 000	-----
302-112-3	Columbia River at Bonneville, Oreg., hydroelectric plant.....	36, 272, 000	22, 305, 000	7, 500, 000	6, 467, 000
	Total, power installation projects.....	42, 117, 000	25, 305, 000	10, 345, 000	6, 467, 000
	Flood Control, Sacramento River, Calif.: Dredging channels, building levees, bank protection, etc.....	\$ 300, 000	-----	300, 000	-----
	Total, flood control, Sacramento River.....	300, 000	-----	300, 000	-----
	Total, Corps of Engineers.....	1, 690, 434, 103	1, 255, 962, 553	150, 645, 000	283, 826, 550

¹ Blanket project consisting of a large number of individual items. Docket numbers will be assigned to the projects later.

² Includes only construction costs for which expenditures will be made during fiscal year 1942. Estimated total construction costs of the projects involved not immediately available.

ately available.

³ Blanket project consisting of a large number of individual items. No docket numbers assigned.

⁴ List of projects to be constructed during fiscal year 1942 not immediately available.

TABLE NO. I.—Projects recommended for fiscal year 1942—Continued

Docket No.	Name and location of project	Total estimated cost	Estimated expenditure to June 30, 1941	Recommended expenditure for fiscal year 1942	Additional expenditure required thereafter to complete
	WAR DEPARTMENT—Continued				
(1)	Panama Canal:				
	Improvements, betterments, and replacements of facilities.....	\$2,500,000		\$2,500,000	
(1)	Construction of special protective works.....	\$4,670,000		4,670,000	
	Improvement and enlargement of the capacity of the Panama Canal.....	277,000,000	\$10,000,000	30,000,000	\$237,000,000
	Total, Panama Canal.....	284,170,000	10,000,000	37,170,000	237,000,000
	Total, War Department.....	2,361,854,846	1,317,962,553	523,065,743	520,826,550
	DISTRICT OF COLUMBIA				
(2)	Public Works:				
	Construction of public school buildings, highways, water and sewer systems, institutions, etc.....	\$7,500,000		7,500,000	
	Total, District of Columbia.....	7,500,000		7,500,000	
	Grand total, Construction Agencies (Class I).....	6,155,523,449	2,921,227,637	1,156,768,080	2,077,527,732

¹ Blanket project consisting of a large number of individual items. No docket numbers assigned.

² Includes only construction costs for which expenditures will be made during fiscal year 1942. Estimated total construction costs of the projects involved not im-

mediately available.

³ Blanket project consisting of a large number of individual items. Docket numbers will be assigned to the projects later.

TABLE NO. II

ESTIMATED CONSTRUCTION FINANCING BY THE FEDERAL GOVERNMENT FOR FISCAL YEAR 1942

This table includes estimates of construction to be financed by the construction agencies (Class II) during the fiscal year 1942 and the Federal share of such financing as recommended in the Budget of the United States Government.¹ The estimated cost of construction to be so financed is \$2,507,700,000, and the Federal share provided by means of loans, grants, or guaranties of loans is \$2,001,000,000. The estimated Federal share of such financing since 1932, classified according to the type of financing, is as follows:²

Fiscal year	Grants-in-aid	Loans	Guaranties of loans	Total, Federal share
1932	\$188,717,000			\$188,717,000
1933	165,735,000	\$29,498,000		195,233,000
1934	881,613,000	208,773,000		1,090,386,000
1935	738,592,000	321,833,000	12,389,000	1,072,814,000
1936	1,314,962,000	233,464,000	195,412,000	1,743,838,000
1937	1,696,613,000	125,229,000	399,026,000	2,220,868,000
1938	1,255,785,000	122,600,000	427,003,000	1,805,388,000
1939	1,918,833,000	232,508,000	672,954,000	2,824,295,000
1940	1,307,925,000	452,473,000	702,647,000	2,463,045,000
1941	1,082,000,000	354,600,000	965,000,000	2,401,600,000
1942	789,000,000	377,000,000	835,000,000	2,001,000,000

The largest share, approximately \$1,059,000,000, of recommended Federal financing of construction in 1942 will be for housing. The total estimated cost of such housing, including the funds provided by non-Federal sources, is \$1,217,500,000.

It should be recognized that the estimates of construction to be financed as presented in this table may be less or greater than the amount finally financed, depending entirely on the willingness of public or private agencies or individuals to assume the obligations required. However, the estimates presented reflect the best judgments of the agencies involved.

In order to explain in more detail the significance of the estimates, there are presented in the following notes brief explanatory data on the types of construction and financing that are involved.

Federal Loan Agency

Reconstruction Finance Corporation

The estimated amount of construction financing to be undertaken by the Corporation during the fiscal year 1942 has been divided into three groups:

(1) Loans to public agencies to aid in financing projects authorized under Federal, State, or municipal laws;

(2) Loans to be made by the R. F. C. Mortgage Co. for building construction;

(3) Loans for the construction of defense plants under the recent amendment to Section 5 of the Reconstruction Finance Corporation Act.

It is difficult to estimate accurately the amount of construction that will ultimately be financed from all loans made available by the Corporation, since many of its general business loans, which are not made specifically for construction purposes, may, in the end, be so used. The estimates of \$185,000,000 of construction to be financed and of the Federal share of \$150,000,000 are based, however, on construction loans alone.

None of the Federal financing involved will be represented by disbursements from the Treasury.

Federal Housing Administration

The estimated volume of insurance to be written during the fiscal year 1942 will not represent a disbursement by the Federal Government. Rather, it will be an assumption of an obligation through the insurance fund that is maintained by the Federal Housing Administration. In general, the insurance written by the Federal Housing Administration covers two general types of loans: (1) Those for financing repairs, alterations, and improvements upon or in connection with existing structures; and (2) those for the building of new structures upon urban, suburban, or rural property.

The total volume of loans insured under the first type noted above is not included in the estimate of \$835,000,000, since these largely fall within the category of current repair and modernization operations and are thus excluded from consideration as new construction. Also, under the present law, the authority to insure such loans expires June 30, 1941.

The second type of financing described above is represented in the estimated total of \$835,000,000 shown in the table, and is provided for under Title II of the National Housing Act. The total insurance liability under this type of loan is \$4,000,000,000. The law provided for a \$3,000,000,000 limitation, and in November 1939, the President, under the authority given him in the National Housing Act, increased the liability to \$4,000,000,000. The difference between the amount of insurance written and the total estimated cost of \$965,500,000 for the construction to be financed is, of course, provided from the funds of the private individuals and corporations who assume the mortgages upon which the insurance is written.

It is currently estimated that the Federal Housing Administration is insuring loans on approximately 40 percent of the single-family and multiple-family buildings being constructed in the United States.

¹ In some cases, the actual amount of the Federal share is recommended. In other cases, the estimated Federal share is determined by the Budget estimates of the administrative expenses required.

² Figures shown for years prior to 1941 are actual. Figures for 1941 and 1942 are estimated.

None of the Federal financing involved will consist of disbursements from the Treasury.

Federal Security Agency

National Youth Administration

No estimates are immediately available as to the part of the \$92,000,000 recommended for expenditure by the National Youth Administration during the fiscal year 1942 that will be used as grants-in-aid for the construction of training quarters, shops, camps, etc., for the work program of the Administration.

Civilian Conservation Corps

No estimates are immediately available as to the part of the \$265,000,000 recommended for expenditure by the Civilian Conservation Corps during the fiscal year 1942 that will be used for the construction of buildings, structures, roads, etc., under the work program of the Corps.

Federal Works Agency

Public Roads Administration

The amount of Federal financing that is recommended for the fiscal year 1942 under the Public Roads Administration will be for three purposes:

(1) The grants provided for highway construction under the regular Federal Aid Highway System acts will total \$110,000,000. These funds will be provided from the Treasury and will be accompanied by an expenditure from State funds of \$114,000,000, making a total estimated cost of the construction to be financed of \$224,000,000.

(2) The construction of secondary or feeder roads out of the regular authorized appropriations, involving a recommended expenditure of \$20,000,000 from the Treasury and a concurrent expenditure of \$21,000,000 from State funds, making a total of \$41,000,000.

(3) Construction expenditures for the elimination of hazardous railroad grade crossings under authorizations of the Congress. Recommended expenditures from the Treasury are set at \$30,000,000, and \$1,000,000 of State funds will be spent concurrently, making a total estimated expenditure of \$31,000,000.

Public Works Administration

The expenditures recommended during 1942 are for two types of financing operations: (1) An expenditure of \$3,000,000 is recommended to provide for disbursements on loans to States and municipalities for public works construction; (2) an expenditure of \$35,000,000 is recommended for grants to States and municipalities for public works construction. Both these expenditures will be in the form of Treasury withdrawals.

Thus, the Federal financing undertaken by the Public Works Administration during the fiscal year 1942 will

involve \$38,000,000, but the total estimated cost of construction to be financed will be only \$27,200,000. The difference is explained by the fact that the grant payments follow the completion of construction operations, and while on many of the projects financed by the Public Works Administration construction has been completed, or at least nearly so, the grant and loan payments are in many cases being held up until final settlement is made to the satisfaction of the Administration.

U. S. Housing Authority

The figure of \$162,000,000 for the Federal financing of construction expenditures by the Authority during 1942 under loans to public housing agencies does not include the annual contributions that are made to the housing authorities by the Federal Government. The total estimated cost of \$180,000,000 for the construction to be financed includes the contributions by the local housing authorities that are spent with the funds from the United States Housing Authority.

The Federal share of \$162,000,000 for construction financing is not a Treasury disbursement. It is disbursed from funds made available through special obligations issued by the Authority and guaranteed by the United States.

Work Projects Administration

The expenditure of \$594,000,000 that is recommended for 1942 is a part of the supplemental work relief appropriation of \$990,000,000 contained in the Budget. These funds will be withdrawn from the general fund of the Treasury during the year. The total cost of the construction to be undertaken is estimated to be \$792,000,000, which, under the present law, would involve an estimated expenditure of approximately \$198,000,000 by the State and local governments concerned from their own funds concurrently with the grant-in-aid by the Work Projects Administration. The construction projects undertaken will include all types of State and local public works.

Department of Agriculture

Rural Electrification Administration

The estimated \$50,000,000 of Federal financing for 1942 is equal to the total estimated cost of the construction to be financed, since the Federal Government finances practically 100 percent of the construction undertaken by means of the Rural Electrification loans. These funds are made available to the Rural Electrification Administration from a loan advanced to the Rural Electrification Administration by the Reconstruction Finance Corporation. None of these estimates are duplicated in the estimates shown for the Reconstruction Finance Corporation.

Farm Security Administration

Construction to be financed by the Farm Security Administration during the fiscal year 1942 is of two types: (1) that undertaken under the rural rehabilitation loans; and (2) that undertaken under loans through the Bankhead-Jones Farm Tenancy Act. For the first type, it is estimated that \$4,000,000 will be used

for construction; and that \$8,000,000 will be used for construction under the farm tenancy loans. These disbursements will be made from loans advanced to the Farm Security Administration by the Reconstruction Finance Corporation. The estimates are not duplicated in the estimates shown for the Reconstruction Finance Corporation.

FEDERAL SIX-YEAR PROGRAM OF PUBLIC WORKS

TABLE II.—Estimated construction financing by Federal Government for fiscal year 1942

Name of agency	Type of financing	Total estimated cost of construction to be undertaken or financed	Amount of Federal financing
FEDERAL LOAN AGENCY			
Reconstruction Finance Corporation:			
Loans to public agencies to aid in financing projects authorized under Federal, State, or municipal law under section 5 (d) of the Reconstruction Finance Corporation Act, as amended.	Loan.....	\$75,000,000	\$60,000,000
Loans by R. F. C. Mortgage Co.	do.....	60,000,000	50,000,000
Loans for construction under act of June 25, 1940 (Public, 664, 76th Cong.), amending section 5 (a) of the R. F. C. Act.	do.....	50,000,000	40,000,000
Total, Reconstruction Finance Corporation.....		185,000,000	150,000,000
Federal Housing Administration:			
Small home mortgages and rental and group housing mortgages (exclusive of modernization and property improvement notes insured).	Insurance of loan.....	\$ 965,500,000	\$ 835,000,000
Total, Federal Housing Administration.....		965,500,000	835,000,000
Total, Federal Loan Agency.....		1,150,500,000	985,000,000
FEDERAL SECURITY AGENCY			
National Youth Administration:			
Aid in the construction of training quarters, shops, camps, etc., for the work program.....	Grant-in-aid.....	(¹)	(¹)
Total, National Youth Administration.....		(¹)	(¹)
Civilian Conservation Corps:			
Construction of buildings, structures, roads, etc., under the work program of the corps.....	Grant-in-aid.....	(¹)	(¹)
Total, Civilian Conservation Corps.....		(¹)	(¹)
Total, Federal Security Agency.....		(¹)	(¹)
FEDERAL WORKS AGENCY			
Public Roads Administration:			
Federal-aid highway system.....	Grant-in-aid.....	224,000,000	110,000,000
Federal-aid secondary or feeder roads.....	do.....	41,000,000	20,000,000
Elimination of grade crossings.....	do.....	31,000,000	30,000,000
Total, Public Roads Administration.....		296,000,000	160,000,000
Public Works Administration:			
Loans to States and municipalities for public works construction.....	Loan.....	\$ 27,200,000	{ 3,000,000
Grants to States and municipalities for public works construction.....	Grant-in-aid.....		
Total, Public Works Administration.....		27,200,000	33,000,000
U. S. Housing Authority:			
Loans to public housing agencies.....	Loan.....	180,000,000	162,000,000
Total, U. S. Housing Authority.....		180,000,000	162,000,000
Work Projects Administration:			
Work relief construction (excluding work-relief nonconstruction) for State and local public works construction.....	Grant-in-aid.....	792,000,000	594,000,000
Total, Work Projects Administration.....		792,000,000	594,000,000
Total, Federal Works Agency.....		1,295,200,000	954,000,000
DEPARTMENT OF AGRICULTURE			
Rural Electrification Administration:			
Loans under Rural Electrification Act of 1936, as amended.....	Loans.....	50,000,000	50,000,000
Total, Rural Electrification Administration.....		50,000,000	50,000,000
Farm Security Administration:			
Construction of buildings, structures, etc., under rural rehabilitation loans.....	Loans.....	4,000,000	4,000,000
Construction of buildings, structures, etc., under loans pursuant to Bankhead-Jones Farm Tenant Act.....	do.....	8,000,000	8,000,000
Total, Farm Security Administration.....		12,000,000	12,000,000
Total, Department of Agriculture.....		62,000,000	62,000,000
Grand total, Construction Agencies (Class II).....		2,507,700,000	2,001,000,000

¹ Total value of construction of the housing upon which mortgages are insured.² Total volume of insurance written.³ No estimates immediately available.⁴ No separation possible between grants and loans.

TABLE NO. III

PROJECTS AVAILABLE FOR CONSTRUCTION IN LATER YEARS

This table summarizes projects available for construction in later years as proposed by the construction agencies (Class I). Ultimately, this table will also include projects that are proposed for Federal financing by the construction agencies (Class II), but in the short time available, it was not practicable to include them at this time.

The projects summarized in this table have been classified within each purpose classification into four groups: *Group A*—Immediate, when funds are available; *Group B*—Deferred; *Group C*—Indeterminate; and *Unevaluated*.

The total amount necessary to complete the projects reported, according to the purpose classification, is as follows: ¹

TABLE III.—*Projects for future construction*
Purpose classification

	Amount necessary to complete
Water Use and Control:	
Flood control.....	\$561, 569, 300
Irrigation.....	188, 218, 546
Hydroelectric power and transmission facilities.....	² 929, 207, 500
Sanitation systems.....	75, 000
Total, water use and control..	1, 679, 070, 346
Public Land Development:	
Parks.....	67, 174, 093
Forests.....	142, 617, 950
Wildlife.....	1, 818, 350
Total, public land development..	211, 610, 393
Transportation:	
Rivers and harbors.....	77, 846, 765
Aids and assistance to navigation..	38, 556, 990
Airports and airways.....	21, 121, 600
Roads.....	14, 003, 000
Total, transportation.....	151, 528, 355
Government Plant:	
Public buildings.....	219, 121, 000
Research facilities.....	11, 376, 984
Construction for surveys and investigations.....	178, 500

¹ The classification of defense projects is omitted from the table. Ordinarily, the defense classification would include projects of the Navy Bureau of Yards and Docks and the Army Quartermaster Corps. Because of the many questions of national defense policy involved, such projects are omitted entirely.

² This estimate excludes hydroelectric power projects listed in other purpose classifications.

Government Plant—Continued.

Welfare and health.....	\$56, 611, 700
Law enforcement.....	8, 802, 000
Education.....	7, 713, 812
Total, Government plant.....	303, 803, 996
Total, all classifications.....	2, 346, 013, 090

A summary of Federal expenditures for construction and of the Federal share of construction financing during the period from 1931 to 1942 inclusive according to the above general purpose classification is shown in the following table for comparison. These data, of course, include construction undertaken by the construction agencies (Class I) and that aided by the construction agencies (Class II). Therefore, the following table is not directly comparable to the one presented above.

[All figures in thousands]

Fiscal year	Water use and control	Public land development	Transportation	Defense	Government plant	Housing	Miscellaneous	Total
1931.....	\$45, 297	\$27, 356	\$226, 513	\$39, 778	\$104, 037	-----	-----	\$442, 981
1932.....	51, 588	25, 385	264, 208	43, 879	138, 991	-----	-----	524, 051
1933.....	71, 602	19, 496	245, 938	26, 422	147, 438	-----	\$840	511, 736
1934.....	175, 220	116, 737	715, 793	50, 076	342, 916	\$7, 639	36, 856	1, 445, 287
1935.....	260, 971	53, 875	742, 049	53, 895	366, 934	32, 066	6, 221	1, 516, 011
1936.....	457, 757	102, 843	905, 213	38, 381	542, 180	233, 801	8, 899	2, 289, 074
1937.....	420, 661	125, 291	1, 106, 993	59, 083	657, 972	505, 149	6, 627	2, 881, 776
1938.....	380, 935	44, 199	840, 263	60, 910	531, 334	510, 622	1, 859	2, 370, 122
1939.....	468, 912	63, 824	1, 212, 657	144, 463	738, 285	744, 111	16, 190	3, 408, 442
1940.....	440, 830	48, 401	881, 235	175, 942	624, 557	910, 015	46, 179	3, 127, 159
1941.....	418, 548	39, 053	771, 677	987, 462	458, 528	1, 234, 500	25, 680	3, 935, 448
1942.....	371, 576	26, 498	622, 379	648, 031	313, 994	1, 150, 100	25, 190	3, 157, 768

It should be made clear that many of the projects included in Table No. III are being evaluated as rapidly as possible. This is particularly true of the large group of projects listed under "Hydroelectric power and transmission facilities." Also, projects now included within one of the three evaluation groups will be re-evaluated during the course of the coming year.

Therefore, it should be borne in mind that the process of grouping the projects is a dynamic one, and evaluations will change as policies, conditions, and plans change. Projects may move back and forth between the evaluation groups, and this, in itself, is the essence of a continuous planning and programming process. Plans and programs must be flexible.

APPENDIX

STATISTICAL TABLES COVERING THE HISTORICAL DEVELOPMENT AND DISTRIBUTION OF FEDERAL CONSTRUCTION EXPENDITURES, 1921-1941

During the past 20 years, the United States Government has directly influenced construction activity in the United States in a number of different ways. These have included:

1. *Expenditures made by regular Government departments* for the Federal account. The construction financed by these expenditures is carried on directly by the Federal Government and the completed works and structures are owned and operated by it.

2. *Expenditures made by Government corporations* for the Federal account.

3. *Grants-in-aid to State and local governments.*—The construction (including work relief) so financed is carried on (or sponsored) by the State and local governments to which the grants are made, and the completed works and structures are owned and operated by them.

4. *Loans to non-Federal public agencies.*—The construction financed by these expenditures is carried on by the agencies to which the loans are made, and the completed works and structures are owned and operated by these agencies.

5. *Loans to private agencies and guaranties of private loans.*—As in the case of loans to public agencies, responsibility for construction, ownership, and operation is outside the Federal Government. The Government underwrites certain types of private construction loans, principally for housing, and the guaranties of these loans represent contingent liabilities of the Government. Consequently, the construction expenditures made by private agencies under these loan-guaranty arrangements must be considered as a part of the construction activity in which the Government is a participant.

The tables in this Appendix have been compiled to show the expenditures made by the Federal Government since 1921 in each of the categories listed above, classified as to purpose.

In addition to this classification of construction expenditures according to the character of the outlays, many different methods might be used to classify such expenditures according to the purpose for which they were made.

From 1921 to 1932, the bulk of Federal construction expenditures was made for roads, river and harbor improvements (including some flood-control work), public buildings, and irrigation works. Beginning in 1932, these expenditures were extended to include—by

means of grants or loans—practically all types of public and private construction. In considering all the purposes for which Federal construction expenditures are now being made, the expenditures have been divided into six major functional classes in these tables:

1. *Water use and control.*—Including flood control, irrigation, hydroelectric plant and transmission systems, public water-supply systems, and public sewerage systems.

2. *Public land development.*—Including park and forest development, wildlife conservation, and soil erosion control.

3. *Transportation.*—Including roads, river and harbor improvements, aids and assistance to navigation, airports and airways, railroads, canals, and various structures such as wharves, docks, bridges, etc.

4. *Defense.*—Including Army and Navy flying fields, military and naval posts, supply depots, and navy yards.

5. *Government plant.*—Including administrative buildings, post offices, research facilities, hospitals, prisons, and educational buildings.

6. *Housing.*

It is recognized, of course, that this classification is very general, and for that reason each major classification has been in turn further subdivided into several additional classifications. The entire classification scheme in general outline is as follows:

1. *Water use and control:*

- a. Flood control.
- b. Tennessee Valley Authority.
- c. Reclamation and irrigation.
- d. Transmission and hydroelectric plant.
- e. Public water supply systems.
- f. Public sewerage systems.
- g. Miscellaneous water use and control.

2. *Public land development:*

- a. Parks.
- b. Forests.
- c. Wildlife.
- d. Soil erosion control.
- e. Miscellaneous land development.

3. *Transportation:*

- a. Roads, streets, and highways.
- b. Rivers and harbors.
- c. Aids and assistance to navigation.

3. *Transportation*—Continued.
 - d. Airports and airways.
 - e. Canals.
 - f. Railroads.
 - g. Miscellaneous transportation.
4. *Defense*:
 - a. Naval.
 - b. Military.
 - c. Miscellaneous defense.
5. *Government plant*:
 - a. Public buildings.
 - b. Research facilities.
 - c. Surveys and investigations.
 - d. Welfare and health.
 - e. Law enforcement.
 - f. Education.
 - g. Recreation.
 - h. Utilities.
 - i. Miscellaneous general facilities.

In addition to the five groups listed above, there is a general over-all "Miscellaneous" group which is included in some of the tables because the data from which these tables were compiled did not, in some instances, permit more specific identification of purpose.

The tables in this Appendix are divided into five groups, corresponding to the character-of-outlay classification described in the first paragraph of this appendix. In addition, there is a sixth table summarizing all expenditures shown on the other five tables.

Each group of tables has a summary table which classifies the expenditures within that group according to purpose, and within each group of tables there is a table for each major purpose category which details the amounts spent by each Federal agency for each item listed within that purpose.

These tables must be used in the light of the following considerations:

1. The expenditures shown within each fiscal year do not correspond precisely to the total volume of construction activity for which the Federal Government was responsible *in that year*, because Federal procedures (with few exceptions) are such that the actual construction work must be performed before payment can be made. Consequently, construction activity financed by the Federal Government generally precedes actual payment. These tables show expenditures in terms of cash payments from the United States Treasury or from funds of Government corporations, with the exception of private construction loans for which the Federal Government has provided a guaranty. These guaranties are included as of the date they are assumed by the Federal Government.

2. The data from which these tables have been compiled are such that it is not possible in all instances to permit a complete classification of the expenditures involved. For instance, all construction expenditures of the Bureau of Reclamation are shown under "Reclamation and irrigation" although some of such expenditures were for hydroelectric plant and transmission lines. However, the nature of the data available did not permit a separation. Consequently, the compilations presented in these tables are not completely precise insofar as the classifications are concerned.

3. All expenditure data shown are for *new* construction only. Major repairs that are, virtually, new construction are also included. Current maintenance and repair work necessary for the preservation of any works, building, or other structure has been excluded.

4. The data shown for the fiscal year 1941 are preliminary and are subject to further revision.



TABLE NO. 1.—Summary of expenditures for construction of Federal

[All figures

Function	1921	1922	1923	1924	1925	1926	1927
1. Water use and control:							
a. Flood control ¹							\$11,591
b. TVA.....							2,752
c. Reclamation and Irrigation.....	\$6,073	\$4,946	\$5,659	\$6,782	\$3,899	\$3,390	7,276
d. Transmission and electric plant.....							
Total.....	6,073	4,946	5,659	6,782	3,899	3,390	21,619
2. Public land development:							
a. Parks.....							1,842
b. Forests.....	6,382	6,263	6,459	7,817	13,066	12,714	12,151
c. Wildlife.....	129	36	25	8	1	7	24
d. Soil erosion control.....							
Total.....	6,511	6,299	6,484	7,822	13,067	12,721	14,017
3. Transportation:							
a. Roads.....	1,225		2,811	4,678			
b. Rivers and harbors ²	58,820	43,317	51,393	75,892	79,429	69,004	51,041
c. Aids and assistance to navigation.....	806	1,185	607	786	543	997	74
d. Airports and airways.....							
e. Panama Canal ³	16,461	11,062	3,621	7,142	9,093		
f. Nicaragua Canal.....							
g. Alaska R. R.....	9,561	4,358	4,446	2,838	2,074	1,464	1,572
h. Miscellaneous.....	575						
Total.....	87,450	59,922	62,878	91,136	91,139	71,465	52,687
4. Defense:							
a. Navy Department.....	14,212	10,454	10,073	6,177	3,750	3,257	3,027
b. War Department.....	52,461	16,569	12,164	8,459	4,581	7,001	9,684
c. War Department—nonmilitary.....	190						
Total.....	66,863	27,023	22,237	12,636	8,331	10,258	12,711
5. Government plant:							
a. Public buildings.....	9,714	5,299	3,454	2,450	2,756	1,940	8,736
b. Research facilities.....							
c. Surveys and investigations.....							
d. Welfare and health.....	285	12,054	10,291	11,611	5,091	5,981	5,976
e. Law enforcement.....	311	80	174	141	410	73	61
f. Education.....	47	628	24	3	47	150	233
g. Housing.....							
h. District of Columbia.....							
i. Facilities outside continental United States.....				46	27		
Total.....	10,357	17,961	13,943	14,250	8,331	8,144	15,006
6. Miscellaneous.....			1,294	244	253	811	1,560
Grand total.....	177,254	116,161	112,495	132,870	125,020	106,789	117,600

¹ Estimated expenditures for fiscal year 1941 estimated as of January 1941.
² Up to the end of the fiscal year 1926, expenditures for flood control are included under the item "Rivers and harbors." Some maintenance is included.

³ Credits of \$29,000 deducted in Budget statement.

⁴ Credits of \$32,000 deducted in Budget statement.

⁵ Credits of \$30,000 deducted in Budget statement.

⁶ Includes maintenance and operating expenses.

⁷ Credits of \$96,000 deducted in Budget statement.

⁸ Difference between statement No. 2 and statement No. 4 of the Budget is \$1,146,000.

⁹ Difference between statement No. 2 and statement No. 5 of the Budget is \$2,435,000.

¹⁰ Difference between statement No. 2 and statement No. 5 of the Budget is \$19,875,000.

TABLE NO. 1-A.—1.

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
a. Flood control:							
1. Corps of Engineers ¹							\$11,591
2. International Boundary Commission, United States and Mexico.....							
Total.....							11,591
b. Tennessee Valley Authority:							
1. Corps of Engineers ²							2,752
2. Tennessee Valley Authority.....							
Total.....							2,752
c. Reclamation and Irrigation:							
1. Bureau of Reclamation.....	\$6,073	\$4,946	\$5,659	\$6,782	\$3,899	\$3,390	7,276
2. Boulder Dam.....							
3. All-American Canal.....							
4. Bureau of Indian Affairs ³							
5. Small water conservation—Department of the Interior.....							
Total.....	6,073	4,946	5,659	6,782	3,899	3,390	7,276
d. Transmission and electric plant:							
1. Corps of Engineers ⁴							
2. TVA.....							
3. Bonneville project.....							
Total.....							
Grand total.....	6,073	4,946	5,659	6,782	3,899	3,390	21,619

See footnotes on pp. 84 to 87.

public works classified according to function, fiscal years 1921-1941, inclusive

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
\$13,271 711 9,534	\$25,340 330 10,613	\$22,805 9,398 22	\$35,844 9,442 11	\$27,996 23,677 15	\$35,118 24,067 14	\$41,862 8,020 25,170 1,444	\$34,403 31,179 42,648 1,389	\$41,474 41,565 35,545 6,640	\$50,280 35,545 61,648 4,600	\$64,979 36,538 66,982 7,169	\$76,444 31,543 82,099 11,650	\$105,749 39,136 98,690 13,380	\$114,281 60,000 84,351 23,000
23,516	36,283	32,225	45,297	51,588	69,199	76,496	109,519	140,626	142,073	175,668	201,736	256,955	281,632
3,416 11,001 4	4,149 12,462 19	4,077 11,097 292	6,252 20,641 463	6,913 18,117 350 6	6,537 12,799 158 2	8,675 25,048 568	13,826 22,784 843 10,334	14,538 20,900 1,995 24,080	23,190 22,913 1,987 300	18,023 18,462 1,490 2,215	21,158 18,703 2,747 2,819	16,072 12,911 1,098 1,824	17,723 10,658 755 767
14,421	16,630	15,466	27,356	25,355	19,496	34,291	47,787	61,513	48,390	38,190	45,427	31,905	29,903
53,870 290	1,993 57,718 900	2,983 47,437 876	6,719 53,598 1,488	8,342 55,842 2,955	5,017 49,123 2,644	3,754 79,115 1,990	4,096 133,036 3,261	2,741 152,195 992	2,026 147,470 2,165	1,941 99,047 1,815	1,917 76,779 8,633	2,129 61,573 5,094	1,500 45,115 9,148
1,678 1,418 51 264 2,749	3,026 1,280 65 198 1,073	3,026 1,280 65 198 1,073	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581	2,657 2,220 255 157 1,581
69,160	60,611	57,456	67,447	73,852	63,799	90,166	144,459	159,668	155,408	107,795	94,500	93,653	122,599
4,885 10,628	7,314 13,338 584	8,103 11,585 247	12,941 25,655 1,182	13,246 29,718 915	12,626 13,796	14,110 35,542 424	13,686 34,280 411	14,463 17,374	19,053 23,676	14,979 34,375	48,094 61,499	81,652 72,248	248,561 647,701 2,900
11,173	21,236	19,935	39,778	43,879	26,422	50,076	48,377	31,637	42,729	49,354	109,593	153,900	899,162
7,194 61	30,785 1,333	44,294 1,333	73,002 1,195	100,621 632	118,177 108	80,648 2,655	60,054 2,524	69,028 1,312	78,594 908	79,927 838	53,506 3,034	58,079 6,757	57,221 16,182
6,609 30 149	4,608 183 9	12,817 28 121	15,369 28 727	19,237 801	19,856 633	9,397 1,219 533	9,088 1,117 782	11,902 272 764	22,540 99 615	15,391 148 1,249	25,099 106 3,212	31,503 1,697	13,545 1,462
13,982	35,636	69,775	104,037	138,991	147,221	103,638	84,008	100,164	123,753	108,730	112,946	121,672	200,552
2,941 125,193	16,309 188,705	194,857	283,915	333,696	316,137	354,667	434,150	493,708	612,353	479,737	564,201	658,085	1,533,848

Source: Compiled from statements of Federal expenditures for public works construction published annually in *The Budget of the United States Government*. See *The Budget* from 1923-42, inclusive. This statement does not include emergency expenditures from allotments for public works to States, municipalities and other public bodies. However, it does include expenditures from allotments for public works construction (including work relief construction) made to the regular Federal

construction agencies from emergency funds. The sites for construction are included as are vessels for the Coast Guard and Lighthouse Service. All figures on this table and the supporting tables are on a fiscal year basis. In the years up to the end of 1932 it was necessary to supplement the table of public works or construction expenditures with statement No. 2 of the Budget, since that contained information not available in the former.

Water use and control

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
\$13,271 711 9,534	\$25,340 330 10,613	\$22,805 9,398 22	\$35,844 9,442 11	\$27,996 23,677 15	\$35,118 24,067 14	\$41,076 786 31,807 2,596	\$31,807 2,596 41,303 171	\$41,303 171 49,221 1,059	\$49,221 1,059 63,680 1,299	\$63,680 1,299 75,454 990	\$75,454 990 103,789 1,960	\$103,789 1,960 112,200 2,081	\$112,200 2,081
13,271	25,340	22,805	35,844	27,996	35,118	41,862	34,403	41,474	50,280	64,979	76,444	105,749	114,281
711	330					8,020	31,179	41,565	35,545	36,538	31,543	39,136	60,000
711	330					8,020	31,179	41,565	35,545	36,538	31,543	39,136	60,000
9,534	10,613	8,611	6,357 1,686	5,424 17,019	3,488 19,709	3,368 19,634 39	15,731 22,180 1,725	25,486 18,913 4,864	36,463 5,588 8,550	47,640 7,354 7,651	64,394 9,093 3,550	93,642 5,046	81,211 3,140
9,534	10,613	9,398	9,442	23,577	24,067	25,170	42,648	50,947	61,648	66,982	82,099	98,690	84,351
		22	11	15	14	2 1,442	1,389	6,640	4,600	7,154 15	6,745 4,905	2,529 10,851	10,000 13,000
		22	11	15	14	1,444	1,389	6,640	4,600	7,169	11,650	13,380	23,000
23,516	36,283	32,225	45,297	51,588	59,199	76,496	109,519	140,626	142,073	175,668	201,736	256,955	281,632

TABLE NO. 1-B.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
a. Parks:							
1. National Park Service.....							\$1,842
2. Other public parks.....							
Total.....							1,842
b. Forests:							
1. Forest Service, ⁴ total.....	\$6,382	\$6,263	\$6,459	\$7,817	\$13,066	\$12,714	12,151
c. Wildlife:							
1. Bureau of Biological Survey.....	129	36	25	5	1	7	24
2. Bureau of Fisheries.....							
Total.....	129	36	25	5	1	7	24
d. Soil erosion control:							
1. Soil Conservation Service.....							
2. Extension Service.....							
3. General, Department of Agriculture.....							
Total.....							
Grand total.....	6,511	6,299	6,484	7,822	13,067	12,721	14,017

TABLE NO. 1-C.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
a. Roads:							
1. Bureau of Public Roads ⁴ , total.....	⁷ \$1,225		\$2,811	\$4,678			
b. Rivers and harbors:							
1. Corps of Engineers ⁴ , total.....	58,820	\$43,317	51,393	75,692	\$79,429	\$69,004	\$51,041
c. Aids and assistance to navigation:							
1. Lighthouse Service.....	808	1,185	607	786	543	997	74
2. Coast Guard.....							
Total.....	808	1,185	607	786	543	997	74
d. Airports and airways:							
1. Bureau of Air Commerce.....							
2. Civil Aeronautics Authority.....							
Total.....							
e. Panama Canal:							
1. Panama Canal ¹⁴ , total.....	16,461	11,062	3,621	7,142	9,093		
f. Nicaragua Canal:							
1. Nicaragua Canal, total.....							
g. Alaska R. R.:							
1. Alaska R. R., total.....	9,561	4,358	¹¹ 4,446	2,838	2,074	1,464	1,572
i. Miscellaneous:							
1. War Department.....	575						
2. Arlington Memorial Bridge.....							
Total.....	575						
Grand total.....	87,460	59,922	62,878	91,136	91,139	71,465	52,687

TABLE NO. 1-D.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
a. Navy:							
1. Bureau of Yards and Docks, total.....	\$14,212	¹² \$10,454	\$10,073	\$6,177	\$3,750	\$3,257	\$3,027
b. Army:							
1. Quartermaster Corps.....	52,461	16,569	12,164	6,459	4,581	7,001	9,634
2. Nonmilitary ¹³	190						
Total.....	52,651	16,569	12,164	6,459	4,581	7,001	9,634
Grand total.....	66,863	27,023	22,237	12,636	8,331	10,258	12,711

¹ Up to the end of the fiscal year 1926, flood control expenditures were reported under rivers and harbors work. Also includes funds allotted to the Department of Agriculture.

² This item covers dam No. 2 at Muscle Shoals, a project of the Corps of Engineers which is now part of TVA. The original objectives were navigation and the generation of power for nitrates in time of war and fertilizers in time of peace. In the years following 1929 the construction expenditures at dam No. 2 are listed in the Budget

as hydroelectric plant and appear under "Transmission and electric plant" in the analyses.

³ In 1926 credits deducted in Budget Statement amounted to \$29,000, in 1927 to \$29,000, in 1928 to \$32,000, and in 1929 to \$30,000.

⁴ In the years up to the end of 1929 the expenditures for irrigation projects in the Bureau of Indian Affairs were not separated from the general public works expenditures for this Bureau.

2. Public Land development

in thousands)

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
\$3,416	\$4,149	\$4,077	\$6,246 6	\$8,900 13	\$6,537	\$8,675	\$13,826	\$14,538	\$23,190	\$18,023	\$21,158	\$16,072	\$17,723
3,416	4,149	4,077	6,252	6,913	6,537	8,675	13,826	14,538	23,190	18,023	21,158	16,072	17,723
11,001	12,462	11,097	20,641	18,117	12,799	25,048	22,784	20,900	22,913	18,462	18,703	12,911	10,658
4	19	161 131	169 294	16 334	6 162	300 268	867 176	1,861 134	1,939 48	1,248 242	1,140 1,607	1,098	765
4	19	292	463	350	158	568	843	1,995	1,987	1,490	2,747	1,098	765
							10,334	22,130 1,950	300	215	2,819	1,824	767
				5	2								
				5	2		10,334	24,080	300	215	2,819	1,824	767
14,421	16,630	15,466	27,356	25,385	19,496	34,291	47,787	61,513	48,390	38,190	45,427	31,905	29,903

3. Transportation

in thousands)

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
	* \$1,993	\$2,983	\$6,719	\$8,342	\$5,617	\$3,754	\$4,096	\$2,741	\$2,026	\$1,941	\$1,917	\$2,129	\$1,500
\$58,870	57,718	47,437	53,598	55,842	49,123	79,115	133,036	152,195	147,470	99,047	76,779	61,573	45,115
290	900	790 86	1,096 392	1,165 1,790	1,451 1,193	1,520 470	2,471 790	368 624	1,611 554	1,510 305	8,633	5,094	9,148
290	900	876	1,488	2,955	2,044	1,990	3,261	992	2,165	1,815	8,633	5,094	9,148
		1,678	3,026	2,657	628	342	1,784	828	766				
										2,216	4,232	8,799	34,000
		1,678	3,026	2,657	628	342	1,784	828	766	2,216	4,232	8,799	34,000
		1,418	1,280	2,220	5,276	4,582	1,956	2,478	2,520	2,223	2,457	15,700	32,271
		51	65										
		264	198	255	157	353	325	329	438	528	482	358	565
		2,749	1,073	1,581	354	30	1	5	23	25			
		2,749	1,073	1,581	354	30	1	5	23	25			
59,160	60,611	57,456	67,447	73,852	63,799	90,166	144,459	159,568	155,408	107,795	94,500	93,653	122,599

4. Defense

in thousands)

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
\$4,885	\$7,314	\$8,103	\$12,941	\$13,246	\$12,626	\$14,110	\$13,686	\$14,463	\$19,053	\$14,979	\$48,094	\$81,652	\$248,561
6,288	13,338 584	11,585 247	25,555 1,182	29,718 915	13,796	35,542 424	34,280 411	17,374	23,676	34,375	61,499	72,248	647,701
6,288	13,922	11,832	26,837	30,633	13,796	35,966	34,691	17,374	23,676	34,375	61,499	72,248	647,701
11,173	21,236	19,935	39,778	43,879	26,422	50,076	48,377	31,837	42,729	49,354	109,593	153,900	1,899,162

* Certain items representing construction expenditures from special funds (co-operative work, Forest Service and roads and trails for States, National Forest funds) have not been included in the Bureau of the Budget's Statement of public works expenditures from 1921-32 (fiscal years). These amounts, which appear in statement No. 2 of the Budget have been included in the above schedule in order to make the Budget statement of public works expenditures consistent within itself for the entire

period from 1921 through 1941. The following expenditures have been added to the amounts appearing in the Budget statement of public works expenditures: \$6,382,000 in 1921, \$2,001,000 in 1922, \$1,411,000 in 1923, \$2,814,000 in 1924, \$2,938,000 in 1925, \$2,793,000 in 1926, \$1,909,000 in 1927, \$1,168,000 in 1928, \$2,234,000 in 1929, \$2,234,000 in 1930, \$2,965,000 in 1931, and \$2,750,000 in 1932.

TABLE No. 1-E.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
a. Public buildings:							
1. Architect of the Capitol.....							
2. White House.....							
3. Procurement Division.....	\$8,134	\$5,299	\$3,454	\$2,450	\$2,756	\$1,940	\$8,736
4. Public Buildings Administration.....							
5. Supreme Court.....							
6. Federal Security Agency.....							
7. U. S. Maritime Commission.....							
8. Department of Agriculture, Government Island, Calif.....							
9. American Red Cross.....							
10. Warehouse, Washington, D. C.....							
11. War Department.....	898						
12. Legislative buildings and grounds, Interior Department.....	679						
13. Courthouse, Interior Department.....	3						
Total.....	9,714	5,299	3,454	2,450	2,756	1,940	8,736
b. Research facilities:							
1. Bureau of Animal Industry.....							
2. Bureau of Dairy Industry.....							
3. Bureau of Plant Industry.....							
4. Bureau of Entomology and Plant Quarantine.....							
5. Bureau of Agricultural Engineering.....							
6. Weather Bureau.....							
7. Beltsville.....							
8. Agricultural Research Stations.....							
9. Miscellaneous agricultural research facilities.....							
10. National Advisory Committee for Aeronautics.....							
11. Bureau of Standards.....							
12. Bureau of Mines.....							
13. Bureau of the Census.....							
Total.....							
c. Surveys and investigations:							
1. Geological Survey.....							
2. International Boundary Commission, United States, Canada, Alaska.....							
3. Coast and Geodetic Survey.....							
Total.....							
d. Welfare and health:							
1. Bureau of Indian Affairs.....							
2. Veterans' Administration.....		11,853	10,060	11,238	4,673	5,150	4,599
3. Bureau of Prisons.....	182	190	112	99	178	618	1,261
4. Department of Interior, hospitals.....	103	11	119	274	240	213	116
5. Department of State, sanitation.....							
Total.....	285	12,054	10,291	11,611	5,091	5,981	5,976
e. Law enforcement:							
1. Immigration and Naturalization Service.....	311	80	174	141	410	73	61
2. Department of Commerce.....							
Total.....	311	80	174	141	410	73	61
Education:							
1. Howard University.....		177	24	3	47	150	233
2. Smithsonian Institution.....							
3. Expositions and memorials, miscellaneous agencies.....	47	351					
Total.....	47	528	24	3	47	150	233
g. Housing:							
1. Interior, subsistence homesteads.....							
2. District of Columbia Alley Dwelling Authority.....							
Total.....							
h. District of Columbia, total.....							
i. Facilities outside continental United States:							
1. Foreign Service buildings office.....							
2. American Battle Monuments Commission.....							
3. Alaska, miscellaneous agencies.....				45	27		
4. Puerto Rico, miscellaneous agencies.....							
5. Philippine Islands, miscellaneous agencies.....							
6. Virgin Islands—miscellaneous agencies.....							
Total.....				45	27		
Grand total.....	10,357	17,961	13,943	14,250	8,331	8,144	15,006

TABLE No. 1-F.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
6. Miscellaneous: Various agencies, total.....			1,294	244	253	811	1,560

*The figures from 1934 to 1940, inclusive, represent residual amounts after the Department of Commerce figures on Federal grants for highways were deducted from the total grants and expenditures of the Bureau of Public Roads as reflected in table No. 3 of the Budget.

¹ Appears in statement No. 2 but not in statement No. 6 of the Budget.

² Appears in statement No. 2 but not in statement No. 5 of the Budget.

³ Up to the end of the fiscal year 1926 expenditures for flood control are included under "Rivers and harbors." Maintenance is included.

⁴ Maintenance and operation included.

⁵ There is a discrepancy between Budget statements Nos. 2 and 6 which evidently arose from a transposition of numbers in the item listed for the Alaska R. R. (\$4,443,000 in statement No. 6 and \$4,473,000 in statement No. 2.)

5. Government plant

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
		\$1,143	\$3,367	\$8,201	\$5,237	\$1,563	\$1,650	\$1,594	\$3,505	\$4,950	\$1,142	\$328	\$202
		188	9	2									
\$7,194	\$30,785	42,802	69,014	90,603	108,800	76,408	56,631	66,708	75,047	74,857	51,127	56,940	55,890
			297	487	3,545	2,640	1,773	726	42	120	10	862	1,129
				125	595	37					365	811	
			43	608									
		161	272	594									
7,194	30,785	44,294	73,002	100,621	118,177	80,648	60,054	66,028	78,594	79,927	53,506	58,079	57,221
		28	80	28	30	995	683	15	205	153	70	54	52
		43	75	38	23	131	130	29		10	10	15	12
		198	181	81	21	820	580	262	41	338	35	33	87
		21	20	4	11	72	106	57	6	7	492	16	10
		43		5	4	95	121	26	17	3	21	40	16
				43	3	75	90					18	230
		24	21	13	1	6	96	423	37	33	1,641	2,029	1,139
			26	31	6	80	152	1	89	202	251	3,062	4,182
		51	757	236		179	349	8	2	53		165	75
			82	510	5			178	293	6	34	988	10,160
			95	46	4	202	217				31	337	229
		42						313	218	33	449		
	51	1,333	1,195	632	108	2,655	2,524	1,312	908	835	3,034	6,757	16,182
						751	797	123	202	110	730	73	67
					1	23	1	130	285	1,931	56		
			3	3	3	4	3		1		556	110	528
			3	3	4	778	801	253	488	2,041	1,342	¹⁸ 230	¹⁸ 1,570
5,222	4,044	1,737	2,891	2,759	2,237	4,694	5,626	7,234	10,703	3,489	6,587	5,171	5,435
1,251	524	9,948	10,613	12,048	14,303	3,309	2,864	3,808	9,218	9,634	11,715	14,546	7,020
136	40	471	1,478	3,915	2,563	502	65	525	2,403	2,013	6,406	8,651	255
		661	337	515	753	892	533	335	71	255	391	810	535
									145				
6,609	4,608	12,817	15,369	19,237	19,856	9,397	9,088	11,902	22,540	15,391	25,099	¹⁷ 31,503	¹⁸ 13,545
30	183					1,219	117	272	99	148	105		
			28										
30	183		28			1,219	117	272	99	148	105		
149	9	14	458	309		227	663	630	388	801	473	189	79
			30							2		270	
		107	209	492	633	306	114	84	127	446	2,739	1,238	1,383
149	9	121	727	801	633	633	782	764	515	1,249	3,212	1,697	1,462
						2,372							
								312		13	65		
						2,372		312		13	65		¹⁹ 100,000
		7,637	10,410	12,875	7,736	4,205	8,000	12,345	6,871	7,183	20,495	19,661	8,880
		1,939	617	2,402	11	201	17	552	17	69	357	485	705
		1,195	1,180	656	285	257	112	16	12				
		429	479	555	86	834	734	664	206	421	158	133	29
		10	1,027	1,209	177	239	1,061	1,966	12,204	926	4,765	2,523	752
								15	43	43	294	312	
					148	200	718	763	1,256	481	513	292	206
		3,573	3,303	4,822	707	1,731	2,642	3,976	13,738	1,940	6,087	3,745	1,692
13,082	35,636	69,775	104,037	138,991	147,221	103,538	84,008	100,164	123,753	108,730	112,945	121,672	200,552

6. Miscellaneous

in thousands of dollars]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
2,941	16,309												

¹³ Credit of \$96,000.00 deducted in Budget statement No. 2.¹⁴ Cemetery and parks.¹⁵ Includes \$2,900,000 of miscellaneous defense construction by the Department of State not itemized in the table.¹⁶ Includes \$47,000 of construction by Bureau of Mines not itemized in the table.¹⁷ Includes \$975,000 of construction by Bureau of Mines not itemized in the table.¹⁷ Includes \$2,316,000 of construction by the Public Health Service not itemized in the table.¹⁸ Includes \$300,000 of construction by the Public Health Service not itemized in the table.¹⁹ Consists of \$100,000,000 of national defense housing construction by the Federal Works Agency not itemized in the table.

TABLE NO. 2.—Summary of expenditures for construction by Federal corporate and

[All figures

Function	1921	1922	1923	1924	1925	1926	1927
2. Public land development:							
c. Miscellaneous, total.....							
3. Transportation:							
i. Miscellaneous, ¹ total.....	\$4,102	\$1,469	\$631	\$312	\$1,108	\$887	\$1,605
5. Government plant:							
g. Housing, total.....							
Grand total.....	4,102	1,469	631	312	1,108	887	1,605

TABLE

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
2. Public land development:							
c. Miscellaneous:							
1. Farm Security Administration, ² total.....							
3. Transportation:							
i. Miscellaneous:							
1. Inland Waterways Corporation ³	\$2,335	\$1,459	\$604	\$114	\$824	\$476	\$1,139
2. Panama R. R. Co. ⁴	1,767	10	27	198	234	411	466
Total.....	4,102	1,469	631	312	1,108	887	1,605
5. Government plant:							
g. Housing:							
1. Farm Security Administration ⁵							
2. U. S. Housing Authority ⁶							
(P. W. A. Housing Division).....							
Total.....							

¹ Includes vessels.

² Source is U. S. Department of Agriculture Report on the financial status and operations of the Farm Security Administration from inception to June 30, 1939, statement of reconciliation of changes in net worth with statement of revenues and expenditures for each fiscal year from 1935 to 1939, inclusive. 1940 figures represent special tabulation. The real properties (including land) purchased and constructed

by the Farm Security Administration and its predecessors include rehabilitation projects of several types, community or contiguous farm projects, separate farms subsistence homestead projects, suburban housing projects and migratory labor camps. Subsistence homestead projects acquired from the Department of the Interior have been excluded. The land utilization projects cover conservation of all kinds, forestation, terracing, check dams, soil conservation, etc. The cost of land

TABLE NO. 3.—Summary of expenditures for Federal grants for public construction

[All figures

Function	1921	1922	1923	1924	1925	1926	1927
1. Water use and control:							
a. Flood control.....							
c. Reclamation and irrigation.....							
d. Transmission and electric plant.....							
e. Public water supply systems.....							
f. Public sewer systems.....							
g. Miscellaneous.....							
Total.....							
2. Public land development:							
b. Forests.....							
d. Soil erosion control.....							
e. Miscellaneous.....							
Total.....							
3. Transportation:							
a. Roads.....	\$57,452	\$91,653	\$72,148	\$80,969	\$95,337	\$88,480	\$82,975
c. Aids and assistance to navigation.....							
d. Airports and airways.....							
h. Railroads.....							
i. Miscellaneous.....							
Total.....	57,452	91,653	72,148	80,969	95,337	88,480	82,975
4. Defense, total.....							
5. Government plant:							
a. Public buildings.....							
d. Welfare and health.....							
f. Education.....							
g. Housing.....							
j. Recreation.....							
k. Utilities.....							
i. Miscellaneous.....							
Total.....							
6. Miscellaneous, total.....							
Grand total ¹	57,452	91,653	72,148	80,969	95,337	88,480	82,975

See footnotes on pages 92 and 93.

quasi-corporate agencies classified according to function, fiscal years 1921-40 inclusive

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
							\$2	\$18,099	\$47,649			\$5
\$2,523	\$1,633	\$3,839	\$3,177	\$1,639	\$366	\$329	31	134	914	\$5,589	\$10,524	
						5	9,014	33,295	99,992	79,408	9,422	6,024
2,523	1,633	3,839	3,177	1,639	366	334	9,047	51,528	148,555	84,997	19,946	6,029

No. 2-A

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
							\$2	\$18,099	\$47,649			\$5
\$1,566 957	\$1,151 482	\$3,201 638	\$2,709 468	\$1,090 549	\$324 42	\$312 17		1 133	305 609	\$1,754 3,635	\$1,250 9,274	(¹) (¹)
2,523	1,633	3,839	3,177	1,639	366	329	31	134	914	5,589	10,524	
							212	11,668	49,930	33,123 22,744 23,641	5,970 3,452	5,803 221
						5	8,802	21,627	50,062			
						5	9,014	33,295	99,992	79,408	9,422	6,024

and equipment is included.

* Source is special statement of Inland Waterways Corporation. 1940 data not available; books kept on calendar year basis.

* Estimated.

* Source is special statement of Panama R. R. Co. 1940 data not available. From 1937 to 1939 expenditures of the Panama R. R. Steamship Line are included.

* The P. W. A. Housing Division projects were turned over to the United States Housing Authority in November 1937.

classified according to function, fiscal years 1921-40, inclusive ¹

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
						\$29,514 4,088 62	\$140 24,101 35	\$9,152 44,319 13,728	\$494 57,786 9,133	\$530 37,175	\$45,646 1,130	\$25,352 810
						200 419 18	17,494 34,769 349	36,497 101,165 1,248	44,386 103,883 1,728	39,623 88,849 1,942	62,768 136,330 2,260	43,124 90,511 1,619
						34,301	76,888	206,109	217,410	168,119	248,134	161,416
						351 81,774 321	2,032 2,194 1,860	2,134 4,050 17,047	981 6,367 21,904	1,416 1,012 3,382	7,830 2,644 7,226	4,613 1,797 8,930
						82,446	6,086	23,231	29,252	5,810	17,709	15,340
\$82,615	\$84,007	\$77,891	\$155,889	\$188,717	\$165,735	494,846 524 11,856	446,916 2,975 10,329	625,608 4,450 18,150	878,268 6,274 35,107	670,595 5,122 21,320	1,009,419 6,013 34,381	697,456 4,166 19,441
						252	2,514	13,113	12,433	19,208	34,561	24,581
82,615	84,007	77,891	155,889	188,717	165,735	507,478	462,734	662,608	933,340	717,673	1,085,925	747,319
							5,518	6,544	16,354	11,556	34,870	22,042
						122,153 37,083 330	19,000 22,217 35,923	37,901 65,104 110,504	57,910 77,689 124,365	39,825 45,312 104,436	51,835 63,464 181,912	36,615 40,668 127,383
						35,359 29,224 35	86,376 4,981 17,891	168,016 8,414 16,891	186,403 26,958 18,161	130,647 11,919 18,827	166,983 33,179 25,578	92,785 36,004 23,631
						224,184	186,388	408,298	497,295	351,215	526,921	358,030
						33,204	978	8,112	2,962	1,412	5,274	3,778
82,615	84,007	77,891	155,889	188,717	165,735	881,613	738,592	1,314,962	1,696,613	1,255,785	1,918,833	1,307,925

TABLE NO. 3-A.—1. *Water use and control*

[All figures in thousands]

Agency	1934	1935	1936	1937	1938	1939	1940
<i>a. Flood control:</i>							
1. PWA.....	\$11	\$140	\$9,152	\$494	\$530		
2. WPA.....	29,503						
Total.....	29,514	140	9,152	494	530		
<i>c. Reclamation and irrigation:</i>							
1. PWA.....	25	594	416	1,481	353	\$377	\$270
2. WPA.....	4,063	23,507	43,903	56,305	36,822	45,269	25,082
Total.....	4,088	24,101	44,319	57,786	37,175	45,646	25,352
<i>d. Transmission and electric plant:</i>							
1. PWA, total.....	62	35	13,728	9,133		1,130	810
<i>e. Public water supply systems:</i>							
1. PWA.....	200	3,142	12,806	15,057	12,004	29,383	21,048
2. WPA.....	(^o)	14,352	23,601	29,329	27,619	33,385	22,076
Total.....	200	17,494	36,407	44,386	39,623	62,768	43,124
<i>f. Public sewer systems:</i>							
1. PWA.....	419	3,107	29,950	14,070	15,359	28,630	20,508
2. WPA.....	(^o)	31,662	71,215	89,813	73,490	107,700	70,003
Total.....	419	34,769	101,165	103,883	88,849	136,330	90,511
<i>g. Miscellaneous:</i>							
1. PWA, total.....	18	349	1,248	1,728	1,942	2,260	1,619
Grand total.....	34,301	76,888	206,109	217,410	168,119	248,134	161,416

TABLE NO. 3-B.—2. *Public land development*¹

[All figures in thousands]

Agency	1934	1935	1936	1937	1938	1939	1940
<i>b. Forests:</i>							
1. WPA, total.....	\$351	\$2,032	\$2,134	\$981	\$1,416	\$7,839	\$4,613
<i>d. Soil erosion control:</i>							
1. PWA.....				(^o)	176	(^o)	(^o)
2. WPA.....	81,774	2,194	4,050	6,367	836	2,644	1,797
Total.....	81,774	2,194	4,050	6,367	1,012	2,644	1,797
<i>e. Miscellaneous:</i>							
1. WPA, total.....	321	1,860	17,047	21,904	3,382	7,225	8,930
Grand total.....	82,446	6,086	23,231	29,252	5,810	17,709	15,340

See footnotes on pages 92 and 93.

TABLE NO. 3-C.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
a. Roads:							
1. PWA.....							
2. WPA.....							
3. Bureau of Public Roads.....	\$57,452	\$91,653	\$72,148	\$80,969	\$95,337	\$88,480	\$82,975
Total.....	57,452	91,653	72,148	80,969	95,337	88,480	82,975
c. Aids and Assistance to Navigation:							
1. PWA.....							
2. WPA.....							
Total.....							
d. Airports and Airways:							
1. PWA.....							
2. WPA.....							
Total.....							
h. Railroads:							
1. WPA.....							
i. Miscellaneous:							
1. PWA ¹⁰							
2. WPA.....							
Total.....							
Grand total.....	57,452	91,653	72,148	80,969	95,337	88,480	82,975

TABLE NO. 3-D.—

[All figures

Agency	1921	1922	1923	1924	1925	1926	1927
1. WPA, ¹¹ total.....							

¹ WPA figures derived from report Showing the Financial Status of Funds Provided in the Emergency Relief Appropriation Acts of 1935, 1936, 1937, 1938, and 1939 published by the U. S. Treasury Department as of June 30, 1936, 1937, 1938, 1939, and 1940. The figures for 1934 represent CWA and FERA Expenditures. CWA data were drawn from Analysis of Civil Works Program Statistics published by the Works Progress Administration in June 1939 with certain adjustments made to exclude non-Federal contributions. The source of the FERA material was a mimeographed pamphlet issued by the Federal Emergency Relief Administration, Estimated Total Costs of Projects Conducted Under the Emergency Work Relief Program, Continental United States. Data for construction outside continental United States could not be obtained. The FERA figures were distributed over the fiscal years 1934, 1935, and 1936 in accordance with a special tabulation of earnings on FERA projects prepared by the Work Projects Administration. The 1933 figures appearing under WPA in the supporting tables represent FERA expenditures, while the

amounts given for 1936 include both WPA and FERA expenditures. All CWA, FERA, and WPA expenditures were reduced by 15 percent at the suggestion of WPA to exclude maintenance. Cumulative expenditures of \$27,786,000 for land utilization and rural rehabilitation programs administered by the Farm Security Administration could not be excluded from the WPA figures. They are not included in the Farm Security Administration totals. However, transfers to all other Federal agencies are not included under WPA. The Bureau of Public Roads (now Public Roads Administration) figures are those reported by the Department of Commerce. The project type distribution of PWA grants was estimated by applying the percentage which each project type was of the total grant allotment for each fiscal year to the grant payments made within each year. Since grant allotments by project type were not available for 1940 the 1939 percentages were applied to the 1940 grant payment data.

3. Transportation

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
						\$157	\$6,518	\$17,887	\$27,153	\$13,770	\$67,054	\$48,033
						270,879	158,882	377,364	504,575	426,136	749,231	482,141
\$82,515	\$84,007	\$77,891	\$155,889	\$188,717	\$165,735	223,810	281,516	230,357	846,540	230,689	193,134	167,282
82,515	84,007	77,891	155,889	188,717	165,735	494,846	446,916	625,608	878,268	670,595	1,009,419	697,456
						11	10	187	247	1,589	2,637	1,889
						513	2,965	4,263	6,027	3,533	3,376	2,277
						524	2,975	4,450	6,274	5,122	6,013	4,166
						2		21	247	177	377	270
						11,854	10,829	18,129	34,860	21,143	34,004	19,171
						11,856	10,329	18,150	35,107	21,320	34,381	19,441
								1,347	1,258	1,428	1,551	1,675
						252	2,514	13,104	12,095	18,359	34,281	24,557
								9	333	840	280	24
						252	2,514	13,113	12,433	19,208	34,561	24,581
82,515	84,007	77,891	155,889	188,717	165,735	507,478	462,734	662,668	933,340	717,673	1,085,925	747,319

4. Defense

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
							\$5,518	\$6,544	\$16,354	\$11,556	\$34,870	\$22,042

¹ The cost of land is not included in WPA construction grants, the land being supplied by the sponsor. However, in the case of PWA, 1.4 percent of the total estimated cost of projects constructed under the PWA non-Federal program was for the purchase of the site. The RFC states that an extremely small proportion of its loans was expended for the purchase of land, in most cases the entire proceeds of the loan having been used for construction.

² Includes waterways.

³ Includes some grants for flood control.

⁴ Water power development.

⁵ The CWA reports do give a break-down of utilities grants which probably include some made for sewer and water systems.

⁶ Some expenditures for wildlife are listed for WPA in the source but since according to WPA they were not for construction they have been excluded from this tabulation.

⁷ Includes parks.

⁸ Less than 0.1 percent of total; no estimate made.

⁹ Includes bridges, tunnels, viaducts, subways, wharves, and small amount for "other" engineering structures.

¹⁰ In the source this item is described as "Federal government buildings including military and naval" mainly armories according to WPA.

¹¹ Includes improvement of grounds around public buildings.

¹² A break-down of CWA expenditures for public buildings is not available. This figure is a total which is not comparable with the amounts given for public buildings in all other years since it includes all types of buildings.

¹³ One-half the amount listed as having been spent for Sanitation and Health is considered by WPA to have been for construction.

¹⁴ CWA does not give a break-down of "Utilities." Therefore, this may include water and sewer systems which elsewhere have been classified as water use and control.

TABLE NO. 3-E.—5. Government Plant

[All figures in thousands]

Agency	1934	1935	1936	1937	1938	1939	1940
a. Public buildings:							
1. PWA	\$62	\$1,257	\$8,320	\$18,760	\$12,534	\$19,589	\$14,032
2. WPA	122,091	17,743	29,581	39,150	27,291	32,246	22,583
Total	122,153	19,000	37,901	57,910	39,825	51,835	36,615
d. Welfare and health:							
1. PWA	127	3,666	14,768	41,716	17,301	29,383	21,048
2. WPA	36,956	18,551	50,336	35,973	28,011	34,081	19,620
Total	37,083	22,217	65,104	77,689	45,312	63,464	40,668
f. Education:							
1. PWA	330	8,623	70,302	74,053	67,084	129,588	92,828
2. WPA		27,300	40,202	50,312	37,352	52,324	34,555
Total	330	35,923	110,504	124,365	104,436	181,912	127,383
g. Housing:							
1. WPA, total			2,468	5,809	249	3,970	944
i. Recreation:							
1. PWA	7	175	1,456	2,468	3,354	3,014	2,159
2. WPA	35,352	86,201	166,560	153,935	127,293	163,969	90,626
Total	35,359	86,376	168,016	156,403	130,647	166,983	92,785
k. Utilities:							
1. PWA	16	2,793	2,283	15,798	2,118	12,431	8,905
2. WPA	29,208	2,188	6,126	11,160	9,801	20,748	27,099
Total	29,224	4,981	8,414	26,958	11,919	33,179	36,004
l. Miscellaneous:							
1. PWA	35	1,012	4,160	9,350	8,474	11,301	8,096
2. WPA		16,879	11,731	8,781	10,353	14,277	15,535
Total	35	17,891	15,891	18,161	18,827	25,578	23,631
Grand total	224,184	186,388	408,298	497,295	351,215	526,921	358,080

See footnotes on pages 92 and 93.

TABLE NO. 3-F.—6. Miscellaneous

[All figures in thousands]

Agency	1934	1935	1936	1937	1938	1939	1940
a. PWA	\$86	\$978	\$8,112	\$2,962	\$1,412	\$5,274	\$3,778
b. WPA	33,118						
Total	33,204	978	8,112	2,962	1,412	5,274	3,778

TABLE NO. 4.—Summary of expenditures for Federal loans for public construction classified according to function, fiscal years 1933-40, inclusive¹

[All figures in thousands]

Function	1933	1934	1935	1936	1937	1938	1939	1940
1. Water use and control:								
a. Flood control		\$797	\$1,284	\$14,493	\$866	\$668		
c. Reclamation and irrigation	\$1,765	4,895	7,947	1,258	3,501	1,188	\$1,409	\$786
d. Transmission and electric plant		8,427	8,843	38,193	9,174		11,510	3,581
e. Public water supply systems	10,415	28,207	41,904	45,637	44,935	31,549	22,816	14,412
f. Public sewer systems	138	20,615	11,301	10,467	2,192	2,172	2,375	2,623
g. Miscellaneous		507	2,711	1,074	510	1,571	932	1,057
Total	12,316	63,448	73,990	111,022	61,178	37,148	39,042	22,459
2. Public land development:								
d. Soil erosion control							104	117
Total							104	117
3. Transportation:								
a. Roads		2,173	11,841	1,745	408	267	11,876	31,043
c. Aids and assistance to navigation		797	143	268		468		
i. Miscellaneous	15,930	38,424	21,307	56,753	15,828	8,471	9,832	9,220
Total	15,939	41,394	33,291	58,766	16,236	9,206	21,708	40,263
5. Government plant:								
a. Public buildings		1,598	6,109	1,749	713	1,303	2,379	2,584
d. Welfare and health		2,680	13,696	2,818	204	134	6,734	7,632
f. Education		11,452	42,167	15,303	7,391	5,514	10,487	12,156
j. Recreation		217	856	5,502		134	259	294
k. Utilities		435	11,413	2,836	31,938	49,780	68,254	105,701
i. Miscellaneous		145	11,699	805	612	13,268	7,511	8,513
Total		16,527	85,940	29,013	40,858	70,133	96,124	136,880
6. Housing:								
Total						3,388	55,562	196,263
7. Miscellaneous:								
Total	840	3,652	5,243	787	153	267	10,916	42,401
Grand total	20,095	125,021	198,464	199,588	118,425	120,142	223,456	438,383

See footnotes on page 96.

TABLE NO. 4-A.—1. *Water use and control*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
a. Flood control:								
1. PWA.....		\$797	\$1,284	\$14,493	\$866	\$668		
Total.....		797	1,284	14,493	866	668		
c. Reclamation and irrigation:								
1. PWA.....		1,955	5,279	403	2,294	668	\$363	\$411
2. RFC.....	\$1,765	2,940	2,668	855	1,207	520	1,046	375
Total.....	1,765	4,895	7,947	1,258	3,501	1,188	1,409	786
d. Transmission and electric plant:								
1. PWA.....		4,490	428	27,844	9,174		3,161	3,581
2. RFC.....		3,937	8,415	10,549			8,349	
Total.....		8,427	8,843	38,393	9,174		11,510	3,581
e. Public water-supply systems:								
1. PWA.....		7,532	19,116	8,454	4,383	2,741	2,227	2,524
2. RFC.....	10,415	20,675	22,788	37,083	40,552	28,808	20,589	11,888
Total.....	10,415	28,207	41,904	45,537	44,935	31,549	22,816	14,412
f. Public sewer systems:								
1. PWA.....		19,844	11,271	10,467	2,192	2,172	2,020	2,290
2. RFC.....	136	771	30				355	333
Total.....	136	20,615	11,301	10,467	2,192	2,172	2,375	2,623
g. Miscellaneous:								
1. PWA.....		507	2,711	1,074	510	1,571	932	1,057
Total.....		507	2,711	1,074	510	1,571	932	1,057
Grant total.....	12,316	63,448	73,990	111,022	61,178	37,148	39,042	22,459

TABLE NO. 4-B.—2. *Public land development*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
d. Soil erosion control:								
1. PWA.....							\$104	\$117
Total.....							104	117
Grand total.....							104	117

TABLE NO. 4-C.—3. *Transportation*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
a. Roads:								
1. PWA.....		\$2,173	\$11,841	\$1,745	\$408	\$267	\$2,435	\$2,760
2. RFC.....							9,441	28,283
Total.....		2,173	11,841	1,745	408	267	11,876	31,043
c. Aids and assistance to navigation:								
1. PWA.....		797	143	268		468		
Total.....		797	143	268		468		
i. Miscellaneous:								
1. PWA.....		19,046	2,283	41,600	1,223	2,640	829	939
2. RFC.....	\$15,939	19,378	19,024	15,163	14,605	5,831	9,003	8,281
Total.....	15,939	38,424	21,307	56,763	15,828	8,471	9,832	9,220
Grand total.....	15,939	41,394	33,291	58,766	16,236	9,206	21,708	40,263

See footnotes on page 96

TABLE No. 4-D.—5. *Government Plant*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
a. Public buildings:								
1. PWA.....		\$369	\$3,709	\$1,074	\$663	\$1,303	\$363	\$411
2. RFC.....		729	2,400	675	60		2,516	2,173
Total.....		1,098	6,109	1,749	713	1,303	2,879	2,584
d. Welfare and health:								
1. PWA.....		2,680	13,696	2,818	204	134	6,734	7,632
Total.....		2,680	13,696	2,818	204	134	6,734	7,632
f. Education								
1. PWA.....		10,356	41,945	15,298	7,391	5,514	8,755	9,921
2. RFC.....		1,096	222	5			1,732	2,235
Total.....		11,452	42,167	15,303	7,391	5,514	10,487	12,156
. Recreation:								
1. PWA.....		217	856	5,502		134	259	294
Total.....		217	856	5,502		134	259	294
k. Utilities:								
1. PWA.....		435	11,413	2,013	20,896	1,604	5,957	6,752
2. REA ¹				823	11,042	48,176	62,297	96,949
Total.....		435	11,413	2,836	31,938	49,780	68,254	105,701
l. Miscellaneous:								
1. PWA.....		145	11,699	805	612	13,268	7,511	8,513
Total.....		145	11,699	805	612	13,268	7,511	8,513
Grand total.....		16,527	85,940	29,013	40,858	70,133	96,124	136,880

TABLE No. 4-E.—6. *Housing*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
1. U. S. H. A.....						\$3,388	\$55,562	\$196,263
Total.....						3,388	55,562	196,263

TABLE No. 4-F.—7. *Miscellaneous*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
1. PWA.....		\$570	\$4,993	\$537	\$153	\$267	\$10,152	\$11,507
2. RFC.....	\$840	3,073	250	250			704	30,894
Total.....	840	3,652	5,243	787	153	267	10,916	42,401
Grand total.....	840	3,652	5,243	787	153	267	10,916	42,401

¹ Compiled from special tabulations prepared by the United States Housing Authority, Rural Electrification Administration, and Reconstruction Finance Corporation. The project type distribution of Public Works Administration loans was estimated by applying the percentage which each project type was of the total loan allotment for each fiscal year to the loan payments to public agencies within that fiscal year as recorded by the Public Works Administration. Since loan allotments by project type were not available for 1940, the 1939 percentages were applied to the 1940 loan payment data.

² Includes loans to mutual associations and cooperatives.

³ Seven-tenths of one percent of the loans for power development were made for the construction of steam and Diesel engine plants.

⁴ A minute percentage of the loans made by REA was to private utility companies, almost the entire amount having been lent to cooperatives and publicly owned utilities.

TABLE NO. 5.—Summary of expenditures for Federal loans and Federal guaranties for private construction, classified according to function, fiscal years 1933-40, inclusive ¹

[All figures in thousands]

Function	1933	1934	1935	1936	1937	1938	1939	1940
1. Water use and control:								
a. Flood control.....		\$11						
c. Reclamation and irrigation.....		422	\$521					
e. Public water-supply systems.....	\$87	115	53					
g. Miscellaneous.....		427						
Total.....	87	975	574					
2. Land development:								
e. Miscellaneous.....						\$199	\$584	\$1,034
Total.....						199	584	1,034
3. Transportation:								
a. Railroads ¹		74,494	101,309	\$24,077	\$1,095			
f. Miscellaneous.....	99	1,032	225					
Total.....	99	76,426	101,534	24,077	1,095			
5. General facilities:								
d. Welfare and health.....		422	6,457	113				
f. Education.....		76	1,855	6,924				
i. Miscellaneous.....	217	541	2,286	448	1,875	1,518	6,330	8,919
Total.....	217	1,039	10,593	7,485	1,875	1,518	6,330	8,919
6. Housing, total.....		5,312	23,052	197,726	399,348	427,564	675,092	706,784
7. Miscellaneous, total.....					3,512	180		
Grand total ²	403	83,752	135,758	229,283	405,830	429,461	682,006	716,737

TABLE NO. 5-A.—1. Water use and control

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
a. Flood control:								
1. PWA, total.....		\$11						
c. Reclamation and irrigation:								
1. PWA.....		68						
2. RFC.....		354	\$521					
Total.....		422	521					
e. Public water-supply system:								
1. PWA.....		66	53					
2. RFC.....	\$87	49						
Total.....	87	115	53					
g. Miscellaneous:								
1. PWA, total.....		427						
Grand total.....	87	975	574					

TABLE NO. 5-B.—2. Land development

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
e. Miscellaneous:								
1. Farm Security Administration ²								
Total.....						\$199	\$584	\$1,034
Grand total.....						199	584	1,034

See footnotes on page 98.

TABLE No. 5-C.—*S. Transportation*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
<i>h. Railroads:</i>								
1. PWA, total.....		\$74,494	\$101,309	\$24,077	\$1,095			
<i>i. Miscellaneous:⁴</i>								
1. PWA.....		247						
2. RFC.....	\$99	1,685	225					
Total.....	99	1,932	225					
Grand total.....	99	76,426	101,534	24,077	1,095			

TABLE No. 5-D.—*5. General facilities*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
<i>d. Welfare and health:</i>								
1. PWA, total.....		\$422	\$6,457	\$113				
<i>f. Education:</i>								
1. PWA, total.....		76	1,855	6,924				
<i>i. Miscellaneous.</i>								
1. PWA.....		34	2,236					
2. RFC.....		507	50					
3. RFC Mortgage Co. ¹	\$217			448	\$1,875	\$1,022	\$4,311	\$5,732
4. FSA.....						496	2,019	3,187
Total.....	217	541	2,286	448	1,875	1,518	6,330	8,919
Grand total.....	217	1,039	10,598	7,485	1,875	1,518	6,330	8,919

TABLE No. 5-E.—*6. Housing*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
1. PWA.....		\$697	\$7,172	\$2,243	\$285			
2. RFC.....		4,615	3,491	71	37			
3. FSA ²						\$561	\$2,138	\$4,137
4. FHA.....			12,389	195,412	399,026	427,003	672,954	702,647
Total.....		5,312	23,052	197,726	399,348	427,564	675,092	706,784

TABLE No. 5-F.—*7. Miscellaneous*

[All figures in thousands]

Agency	1933	1934	1935	1936	1937	1938	1939	1940
1. PWA, total.....					\$3,512	\$180		

¹ Special tabulations were prepared by the RFC, RFC Mortgage Co., FSA, and FHA. FSA figures for 1940 were taken from a report of the U. S. Department of Agriculture, Farm Security Administration, Tenant Purchase Division entitled "Tenant Purchase Loans" Report No. 8. Certain data pertaining to the RFC was available in its quarterly reports as of June 30, 1938, and June 30, 1939. PWA loans to railroads and housing corporations are recorded figures. Other PWA loans payments were estimated by applying the percentage which each project type represented of the loan allotment in each fiscal year to the net figure remaining after deducting railroad and housing loan payments from total loan payments (private) within each fiscal year.

² If a portion of the loan was spent for the purchase of land this amount has been included. It is estimated by PWA that 1.4 percent of the total estimated cost of PWA non-Federal projects was for the purchase of land. In the case of FHA guaran-

ties because of certain compensating factors present it may be roughly estimated that the entire volume of loans insured was equivalent to the value of the improvements on the land. The mortgages insured represent about 85 percent of the total value of the property while the land amounts to about 15 percent of the total value. The RFC states that an infinitesimal proportion of its loans was expended for the purchase of land, in most cases the entire proceeds of the loan having been used for construction.

³ Terracing, conservation of various types.

⁴ Includes docks, terminals, bridges, and other structures.

⁵ Loans on income-producing business properties; includes repairs and improvements.

⁶ Loans to tenant farmers for purchase and construction under Bankhead-Jones Act.

TABLE NO. 6.—Summary of Federal expenditures, corporation outlays, grants, loans, and
[All figures

Function	1921	1922	1923	1924	1925	1926	1927
1. Water use and control:							
a. Flood Control ¹							\$11,591
b. TVA.....							2,752
c. Reclamation and irrigation.....	\$6,073	\$4,946	\$5,659	\$6,782	\$3,899	\$3,390	7,276
d. Transmission and electric plant.....							
e. Public water-supply systems.....							
f. Public sewerage systems.....							
g. Miscellaneous.....							
Total.....	6,073	4,946	5,659	6,782	3,899	3,390	21,619
2. Public land development:							
a. Parks ²							1,842
b. Forests.....	6,382	6,263	6,459	7,817	13,066	12,714	12,151
c. Wildlife.....	129	36	25	5	1	7	24
d. Soil-erosion control.....							
e. Miscellaneous.....							
Total.....	6,511	6,299	6,484	7,822	13,067	12,721	14,017
8. Transportation:							
a. Roads.....	58,677	91,653	74,959	85,647	95,337	88,480	82,975
b. Rivers and harbors ¹	58,820	43,317	51,393	75,692	79,429	69,004	51,041
c. Aids and assistance to navigation.....	808	1,185	607	786	543	997	74
d. Airports and airways.....							
e. Panama Canal.....	16,461	11,062	3,621	7,142	9,093		
f. Nicaragua Canal.....							
h. Railroads ²	11,328	4,368	4,473	3,036	2,358	1,875	2,038
i. Miscellaneous.....	2,910	1,459	604	114	824	476	1,139
Total.....	149,004	153,044	135,657	172,417	187,584	160,832	137,267
4. Defense:							
a. Navy Department.....	14,212	10,454	10,073	6,177	3,750	3,257	3,027
b. War Department.....	52,461	16,569	12,164	6,459	4,581	7,001	9,684
c. War Department—Nonmilitary.....	190						
d. Miscellaneous.....							
Total.....	66,863	27,023	22,237	12,636	8,331	10,258	12,711
5. Government plant and general facilities:							
a. Public buildings.....	9,714	5,299	3,454	2,450	2,756	1,940	8,736
b. Research facilities.....							
c. Surveys and investigations.....							
d. Welfare and health.....	285	12,054	10,291	11,611	5,091	5,981	5,976
e. Law enforcement.....	311	80	174	141	410	73	61
f. Education.....	47	528	24	3	47	150	233
h. District of Columbia.....							
i. Facilities outside continental United States.....				45	27		
j. Recreation.....							
k. Utilities.....							
l. Miscellaneous.....							
Total.....	10,357	17,961	13,943	14,250	8,331	8,144	15,006
6. Housing, total.....							
7. Miscellaneous, total.....			1,294	244	253	811	1,560
Grand total.....	238,808	209,273	185,274	214,151	221,465	196,156	202,180

¹ From 1921 to 1926, inclusive, expenditures for flood control are included under the item "Rivers and harbors."² From 1921 to 1926, inclusive, expenditures for the National Park Service are not listed in the Budget statement of construction expenditures.

guaranties for new construction classified according to function, fiscal years 1921-40, inclusive

in thousands]

1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940 ⁴
\$13,271 711 9,534	\$25,340 330 10,613	\$22,805 9,398 22	\$35,844 9,442 11	\$27,996 23,577 15	\$35,118 25,832 14 10,502 136	\$72,184 8,020 34,875 9,933 28,522 21,034 952	\$35,827 31,179 75,117 10,267 59,451 46,070 3,060	\$65,119 41,505 96,524 58,501 82,034 111,632 2,322	\$51,640 35,545 112,935 22,907 89,321 106,075 2,238	\$66,177 36,538 105,345 7,169 71,172 91,021 3,513	\$76,444 31,543 129,154 24,290 85,584 138,705 3,192	\$105,749 39,136 124,828 17,771 57,536 93,134 2,676
23,516	36,283	32,225	45,297	51,588	71,602	175,220	260,971	457,757	420,661	380,935	488,912	440,830
3,416 11,001 4	4,149 12,462 19	4,077 11,097 292	6,262 20,641 403	6,913 18,117 850 5	6,537 12,799 158 2	8,675 25,399 568 81,774 321	13,826 24,816 843 12,528 28,130 1,862	14,538 23,034 1,995 28,130 6,667 35,146	23,190 23,894 1,987 1,227 69,553	18,023 19,878 1,490 1,227 3,581	21,158 26,842 2,747 5,567 7,810	16,072 17,524 1,098 3,738 9,969
14,421	16,630	15,466	27,356	25,385	19,496	116,737	53,875	102,843	125,291	44,199	63,824	48,401
82,515 58,870 290	86,000 57,718 900	80,874 47,437 876 1,678 1,418 51	162,608 53,598 1,488 3,026 1,280 65	197,059 55,842 2,955 2,657 2,220	171,352 49,123 3,811 6,379 628 5,270	500,773 79,115 133,036 3,811 12,113 4,582	462,853 152,195 5,710 18,978 1,950	630,094 147,470 8,439 35,873 2,520	880,702 99,047 7,405 23,536 2,223	672,803 99,047 7,405 23,536 2,223	1,023,212 76,779 14,646 38,613 2,457	730,628 61,573 9,260 28,240 15,700
957 1,566	482 1,151	902 5,950	666 3,782	804 2,671	199 16,716	74,564 40,950	101,665 24,047	25,886 69,872	3,400 28,589	5,791 29,458	11,307 45,643	2,933 33,801
144,198	146,251	139,186	226,513	264,208	245,938	715,793	742,049	905,213	1,106,993	840,263	1,212,657	881,235
4,885 6,288	7,314 13,338 584	8,103 11,585 247	12,941 25,655 1,182	13,246 29,718 915	12,626 13,796	14,110 35,542 424	13,686 34,280 411 5,518	14,463 17,374	19,053 23,676	14,979 34,375	48,094 61,499	81,652 72,248
11,173	21,236	19,935	39,778	43,879	26,422	50,076	53,895	38,381	59,083	60,910	144,463	175,942
7,194 6,609 30 149	30,785 51 4,608 183 9	44,294 1,333 12,817 121 7,637 3,573	73,002 1,195 3 15,369 28 727 10,410 3,303	100,621 632 3 19,237 801 12,875 4,822	118,177 108 4 19,856 633 7,736 707	204,390 2,655 2,524 778 49,582 1,219 12,391 4,205 1,731 35,576 29,659 721	85,163 2,524 801 51,458 79,937 117 80,727 8,000 2,642 87,232 16,394 31,876	108,678 1,312 908 253 79,937 272 133,495 132,271 12,345 13,738 173,518 11,250 17,144	137,217 908 488 100,433 99 132,271 6,871 13,738 186,403 58,896 20,648	121,055 838 2,041 60,837 143 111,199 7,183 1,940 130,781 61,699 33,613	108,220 3,034 1,242 95,207 105 195,611 20,495 6,087 167,242 101,433 39,419	97,278 6,757 230 79,803 141,236 19,661 3,745 93,079 141,705 41,063
13,982	35,636	69,775	104,037	138,991	147,438	342,916	360,934	542,180	657,972	531,334	738,285	624,557
						7,689	32,066	233,801	505,149	510,622	744,111	910,615
2,941	16,309				840	36,856	6,221	8,899	6,627	1,859	16,190	46,179
210,231	272,345	276,587	442,961	524,051	511,736	1,445,287	1,516,011	2,299,074	2,881,776	2,370,122	3,408,442	3,127,159

³ Includes the Panama R. R. Co., which operates many enterprises in addition to the railroad, the most important being the Panama R. R. Steamship Line.⁴ No data available for 1940 for Inland Waterways Corporation and Panama R. R. Co.

PART II. REGIONAL DEVELOPMENT PLANS

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THE PROGRAM—REGIONAL DEVELOPMENT PLANS

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FOREWORD

Well-considered programs for national development must, of course, reflect local, State, and regional points of view as well as the best judgment of administrative groups and functional policies. This part II of the report on Development of Resources and Stabilization of Employment reproduces statements on regional development plans prepared in the field in cooperation with regional and State planning agencies and with representative citizens.

What is a region? Americans have always recognized the existence of regions or groups of States within the United States which have distinctive problems or unifying backgrounds. From the earliest Colonial days of the New England Confederation, through the time when the South was clearly recognized, down to the more recent realization of great geographic areas like the Dust Bowl, or the Tennessee Valley, we have thought in terms of regions. In 1935 the National Resources Committee issued a report on Regional Factors in National Planning and Development which reviewed the many types of regions and regional organization in this country. Since that time, many further efforts have been made to organize regionally or on a sub-national basis for both public and private purposes.

The desire of the National Resources Planning Board and its predecessors to aid decentralized planning has contributed a number of experiments in this field. The Board has organized its field staff in regional centers, serving areas with no fixed boundaries and using a variety of different planning methods adapted to the special situations in each area. For strictly administrative and budgetary reasons, the number of centers which the Board could staff was limited to 10, located as follows:

1. Boston, Mass., serving New England.
2. Baltimore, Md., serving the middle Atlantic region.
3. Atlanta, Ga., serving the southeastern region.
4. Indianapolis, Ind., serving the Ohio-Great Lakes region.
5. Dallas, Tex., serving the south-central region.
6. Omaha, Nebr., serving the Missouri Valley.
7. Denver, Colo., serving the Intermountain-Great Plains area.
8. San Francisco, Calif., serving the Southwest.
9. Portland, Oreg., serving the Pacific Northwest.
10. Juneau, Alaska, serving Alaska.

From each of these field offices or regional centers the Board has received preliminary statements of the objectives of regional developments as seen by the regional officers of the Board. These programs have been revised, reworked, and expanded during the last year with the cooperation of State planning boards, regional planning commissions, special advisory groups, and with the active assistance of the field representatives of many Federal agencies. The resulting statements are called "regional development plans." They are obviously first approximations of plans rather than full specifications.

The criteria or statements of objective which these regional plans suggest for testing public-works projects vary as might be expected in accordance with the widely different problems which the regions face. It is hoped that these first statements and the revisions and improvements in these regional plans which are already under way may aid in the public understanding of regional points of view toward development projects and aid the Congress in making decisions concerning them.

PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
NEW ENGLAND: REGION 1, BOSTON, MASS., 1940

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Report of the New England Regional Planning Commission

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LETTER OF TRANSMITTAL

NATIONAL RESOURCES PLANNING BOARD

FIELD OFFICE

BOSTON, MASS.

September 30, 1940.

HON. FREDERIC A. DELANO,

Chairman, National Resources Planning Board,

Executive Office of the President, Washington, D. C.

DEAR MR. DELANO: I transmit herewith copy of a Comprehensive Regional Development Plan for New England, based on objectives adopted by the New England Regional Planning Commission, and compiled from plans and recommendations submitted by the commission, the State planning boards, Federal agencies, regional organizations interested in the development of water resources, of land resources, of air-navigation facilities, of highways, of recreation, and of industry, and other official and unofficial groups. This plan presents the principal objectives toward the achievement of which we believe all public endeavor and private enterprise should be directed.

As a background for these objectives, and to make clear the reasons for their selection, we submit in brief form a summary of present conditions and anticipated trends in respect to the people of the region, where they live, and what they do. So far as our research and studies will permit, we have also indicated those lines of attack which offer the greatest opportunity for early attainment of the objectives.

The purpose of a New England regional plan is not to spend money, but rather to save it by making sure that such money as is spent will be spent wisely. The function of our plan is not to require that public and private activity be carried on according to the preconceived ideas of a few individuals, but rather to permit the desires and needs of the people as a whole, as expressed through democratic media, to be obtained in an orderly and efficient manner. With these views in mind we have prepared the attached Comprehensive Regional Development Plan for New England.

Sincerely yours.

VICTOR M. CUTTER, *Chairman.*

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

NEW ENGLAND

A Ten-Point Program for New England— Summary Statement

1. Land Use

To bring about better conservation and use of our natural resources, a land-utilization program should be adopted, to the end that no land capable of producing a profitable crop shall be idle; that those farm lands which, because of poor-soil conditions or inaccessibility, are submarginal for farming, be withdrawn from cultivation and put to forest or recreation uses; that our 15,000,000 acres of now practically idle woodland be made to produce marketable timber on a paying basis; that erosion be minimized; that full use be made of such mineral deposits as are of sufficient quality and quantity to permit profitable extraction.

2. Recreation

To increase opportunities for recreation for residents and visitors, and to develop commercial recreation, efforts should be made wherever practicable to combine with agricultural, forestry, and water-resource uses the development of recreational possibilities; adequate public camping and bathing facilities should be provided within easy reach of all urban centers and recreational resorts; historical and scenic sites and all roadsides essentially rural and scenic in character should be protected from harmful exploitation and defacement; the highway system should provide adequate and direct access to all important recreation areas and a system of less direct tourways should provide attractive pleasure routes; picnic areas should be developed at convenient intervals along both; wood and waste lands and water bodies should be so managed as to assure the reproduction of wildlife in numbers sufficient to encourage hunting and fishing and, at the same time, preserve all native species.

3. Water Use and Control

To assure effective use and control of our water resources, reservoirs should be constructed, where feasible, near the headwaters of major rivers, and should be supplemented by local protective works and floodplain zoning; pollution should be eliminated where the cost is not out of proportion to the benefits; steps should be taken wherever practicable to conserve low-water flows and to develop water power; water-supply reservoirs and their watersheds should be managed on a multiple-use basis to the maximum extent compatible

with maintenance of purity of the water supply; steps should be taken to insure maximum steady returns from commercial fisheries.

4. Industry

To stabilize and encourage productive industry appropriate to New England, there should be constant improvement of transportation facilities, service by other utilities, distribution methods, living conditions, taxation, and community interest; such industries should be attracted that large industrial centers will have diversification of types of industry, and small industrial towns will have industry that is peculiarly adapted to local conditions; decentralization of industry and development of local handicrafts and other part-time activities should be encouraged.

5. Housing

To improve living conditions, the present deficiency in decent housing should be overcome by the provision of at least a quarter of a million new housing units; in general, new urban housing should be accompanied by slum clearance; in rural areas, resettlement should be encouraged in areas where such services as water supply, electricity, improved roads, and schooling can be made available within the limits of economic practicability.

6. Transportation

To obtain a satisfactory regional transportation system, the different modes of transportation, highway, rail, water, and air, should be improved and integrated to the end that all traffic is carried by that type of transportation which is best suited to carry it; a system of airways should be developed according to plans that provide for class 3 fields or better at all existing air transport stops and at other large population centers, for class 2 fields at secondary population centers and all important recreation centers, and for local airports wherever carefully prepared plans show such facilities will be needed for private or commercial flying; a region-wide highway system should include a coastal limited way running from the New York-Connecticut line into Maine, with branches up the Connecticut and Merrimack valleys and to Cape Cod, a network of through secondary routes designed to accommodate tourist traffic as well as to provide local access, and improve farm-to-market roads serving all rural areas well suited to year-round residence.

7. Education

To make New England people happier and more useful citizens, education, available to all youths and adults as well, should include fundamental types of vocational training; community centers for the promotion of literature, music, art, and adult recreational activities should be fostered; instruction in regard to local conditions, resources, planning, and other governmental problems should be included in the curricula of all schools.

8. Welfare

To provide a greater measure of social security, there should be a permanent, coordinated program in which all gainfully employed workers would have unemployment and old-age insurance; work on carefully planned projects of lasting value to the public would be the basis of relief for those unemployed who are capable of working; and public funds would be set aside regularly to act as a cushion in meeting the fluctuating needs for relief; health should be promoted by making hospitals and other medical services easily accessible to everyone.

9. Defense

To prepare adequately and efficiently to defend ourselves against invasion, our major transportation networks should be so improved that they meet not only peacetime needs but also conform to minimum requirements for defense purposes; expansion of industrial activity and of concomitant business and residential development should proceed along lines that are in harmony with normal peacetime trends to the extent that this is compatible with defense needs; accurate and up-to-date inventories of natural, industrial, and transportation resources should be kept continually available.

10. Administration

To help bring about more efficient government, and a reduction in the tax load, there should be community plans and zoning ordinances; public works programming; actively operating municipal planning boards in all cities and all except possibly the smallest towns; and adequately staffed State planning boards functioning as units in the governments of all six States, cooperating with municipal planning boards, and working together, as a regional planning agency, toward the development of a better New England.

The Problem

To be sound, any action program must achieve carefully conceived and clearly defined objectives. No matter how exactly engineering plans may be drawn up, no matter how efficiently projects may utilize relief labor, no matter how effectively the spending of public funds may combat depression slumps, these procedures are justified only if they produce public good. Ob-

viously, organized foresight offers the surest method of determining what activities will produce the greatest public good, and public planning agencies have been created with the specific task of exercising this foresight.

One of the primary purposes of a planning agency is to keep clearly before administrative officials, and the public, the major objectives that according to considered public opinion, should be accomplished, at least in part, through Government action. In this phase of its work, the planning board's job is one of synthesis. It must take legislative policies, programs of executive agencies, public opinion, and deductions based on impartial research, and fit them into the comprehensive picture of the goal of public endeavor.

After the statement of objectives, the next function of planning is to work out the means for achieving these ends. Lines of action must be indicated and frames of reference must be set up so that the detailed programs of public construction agencies can be harmonized with the general objectives. From the long range point of view, no public-works program can be safely undertaken unless it fits into the comprehensive plan. The special field of public works programming is to determine priorities among the desirable projects, based in part on relative needs and in part on the degree of accomplishment which finances will permit within any given period of time.

Although a large part of any plan is concerned with compensating for past mistakes, another primary phase of planning is the creation of future opportunities. It is not enough to provide, in orderly fashion, for the construction of facilities already badly needed. Government agencies must plan also for the development of facilities that will encourage desirable modifications in the social and economic structure and that will assist established or foster new private enterprises. In addition, planning must aid in making available opportunities for employment that will permit free and intelligent choice by individuals among such occupational fields as agriculture, industry, and other activities largely in private hands.

The need for a comprehensive plan, as contrasted to individual plans for such specific phases of development as highway transportation, flood control, or agriculture, is particularly great in New England, because topography and soil conditions and intensive occupancy have created such an intricate pattern of land use. There are no extensive and unbroken uses of land, either rural or urban, except in some large areas of forest, and even here, recreation has intruded at countless points. Often, exceedingly fertile and profitable farms are entirely surrounded by suburban residences; on the other hand, similar farms may be found in the midst of virtually untillable waste land or forest. Although much vacation activity is attracted to key

localities particularly well known for seashore, mountain, or historic significance, there is hardly a town in the area that does not include within its borders at least one vacation home or business. Then again, although three-fourths of the industrial establishments are concentrated in the 70 largest cities, the remaining 500 plants are scattered throughout the region, chiefly in small, river-valley villages.

Since the types of economic activity are so varied and intricately interwoven, it is natural that the transportation and other facilities that serve the people will be unusually complex. River valleys constitute the basis for much of the transportation pattern, but densely built-up cities, compact mill villages, power dams, and water-supply reservoirs, not to mention floods, all compete for occupation of the narrow strips of river bottom land. In preparing a plan for the uses of land and the provision of facilities in such a river valley, all these uses must be considered in relation to each other, and in relation to the value of the land itself for agricultural purposes.

Similarly, the development of recreational facilities along almost any stretches of New England streams cannot be wisely planned until considered in the light of possible uses of the same streams for water supply, flood-control reservoirs, or for carrying pollution. Areas of level land large enough for airports are rare throughout most of New England; yet there are places in New England where the use of such areas as airports had to be carefully weighed against possibly more desirable uses as recreational parks, industrial sites, fairgrounds, or croplands. In such considerations, availability of alternate sites, transportation facilities, and future needs for air facilities must inevitably play an important part. Still another example of this same complexity may be found in rural areas where there is admixture of farm and estate or summer home use. The provision of local and long distance access, of local facilities, and of schools depends greatly upon the distribution, existing and anticipated, of these uses; at the same time, the future distribution of these uses will depend upon how the provision of facilities is handled.

Because so many different types of use compete for occupancy of the relatively small proportion of good land in New England, because the streams of the region, abundant as they are, must perform so many different and often conflicting services, and because the provision of transportation facilities depends so directly upon how these other problems are, and will be, solved, comprehensive planning is indispensable to New England.

The basic purposes of a regional plan are, then, to coordinate all lines of development into an integrated program, to consider this program in the light of both present deficiencies and long-term needs, and to evaluate all elements of the program in terms of public good.

These purposes have been kept in view in the preparation of this New England regional development plan.

The People

It has already been pointed out that the only real criterion of a project is the extent to which it benefits the people. Hence all planning must be based directly on an analysis of the people and their needs.

New England, predominantly urban, has within its borders three of the four most densely populated States in the country (Rhode Island, Massachusetts, and Connecticut); on the other hand, it has one of the largest forested wilderness areas (northern Maine). Yet, except in this uninhabited area and in the widely varying population aggregates, the pattern of population centers, small industrial towns, farms, and forests is fairly uniform throughout the entire region.

New England people are heterogeneous. About one-third of the population of 8.5 million was born outside of New England; of these 6 percent was born in other parts of this country, another 6 percent came from Canada, 5 percent from the British Isles, and 10 percent from various parts of Europe. More than 2 million of the native-born are of foreign parentage. That New England has been unable to absorb completely this high percentage of foreigners is attested by the fact that a smaller proportion is naturalized and able to speak English than in other parts of the United States.

The population of New England is practically stabilized. Natural population increase is now almost negligible (less than 4 percent during the past decade); yet the birth rate, the proportion of children, and the rate of natural increase, low as they are, have changed little during the past 30 or 40 years. The net amount of migration to and from New England is relatively small, having dropped from a net immigration (principally from Europe) of about half a million in the 1900-10 decade to practically no net migration between 1930 and 1940.

In the past, both foreign immigrants and people of rural New England have flocked to the industrial cities in search of work. The problems occasioned by the decline in rural population have only recently been overshadowed by the urban population problems caused by the industrial depression of the past few years. The urban difficulties are being lessened by the recent migration of population from large to small cities and towns, concomitant with the movement toward decentralization of industry. Increased use of the land for recreation and part-time farming has also counteracted, in part, the downward trend in rural economic activity and population growth.

The significance of the trend toward decentralization of population is borne out by the 1940 population figures which show that for the first time in many

decades, the rate of increase of the three Northern, or rural, States has exceeded that of the three Southern, or industrial, States; that of the total population increase between 1930 and 1940, only 34 percent was accounted for by places of more than 10,000, whereas such places accounted for 81 percent of the gain during the previous decade; that nearly a third of the places of more than 10,000 people lost population during the decade; and that the net gain for all places in that population class was only one and one-half percent, less than half that for the region as a whole.

There can be no doubt that this recent decentralization has been caused, in the main, by distress conditions. Nevertheless, there is good reason to expect that the trend will continue; it should be fostered rather than discouraged. Living conditions are better in the less congested places, and needed services can be provided just as readily. Industries of certain types have already shown willingness, if not distinct inclination, to locate in the smaller cities and towns. Although there is not likely to be any great change in the population pattern in so stabilized an area as New England, definitely rural areas and the more congested cities will probably show slight decreases and most smaller cities and towns will continue to show increases in population during the next decade or two.

Analysis of employment trends shows little marked change in the total percentage of gainfully employed over the past few decades. The proportion of workers has consistently stood at about 42 percent of the total population. There has been, however, an appreciable increase in the proportion engaged in the service occupations, such as transportation, trade, and white-collar jobs, and a corresponding decrease within such primary occupations as manufacturing, farming, and forestry. Thirty years ago, nearly 60 percent of all employed persons were engaged in manufacturing or the cultivation or extraction of natural resources; today, that figure is probably less than 50 percent.

The most significant recent trend in employment is one that does not show up in general classification figures, namely, an increase in the proportion of those with multiple sources of income. Because of the instability of employment during the past decade, thousands have had to resort to combinations of part-time farming, industrial work, and service occupations, in whatever proportions seemed most practical. Mixed occupations, especially farming in combination with either industry or recreational service, will undoubtedly continue and increase as the means of livelihood for large numbers of families, especially in rural areas.

Revival of industrial employment, or at least check of its present decline, is essential if New England is to maintain any degree of prosperity. To accomplish this, industry must be placed on a firmer footing, and

this, in turn, must be preceded by improvement of the industrial environment and increase, wherever possible, in the number and types of industry dependent upon local resources. The greatest opportunities for industrial employment will be in those places where industry is most closely tied to local resources and skills; where housing and local municipal services are most favorable to industry; where municipal development has been such as to maintain a sound financial structure; where easy access is provided by modern transportation facilities.

Agricultural employment will undoubtedly continue to decline, although the decline will be in part, perhaps in large measure, offset by part-time farming and forestry. At the same time that the soil and the topography indicate a need for retirement of much land from agriculture, and hence for reduction of full-time farming, the distinct possibilities for obtaining income supplementary to agriculture point to increases in the practice of part-time farming and partial-subsistence farming. The most fruitful sources of supplemental income, besides local industry, will be recreational service, forestry, and local handicrafts.

The hurricane of 1938 made New England much more forest-conscious than it had ever been. Revision of laws relating to forestry, and improvement of marketing methods will do much to increase the possibilities for employment in this field.

Local handicrafts have suffered because of the over-emphasis on mass production during the decade of the twenties, and because of the emphasis, in the field of agriculture, on cash crop specialization. The increased popularity of cooperatives as a marketing medium for small producers, the advent of educational programs emphasizing the opportunities for, and the ways of carrying on, home industries, and the natural increase in self-reliance that is born of financial hardship will do much to revive and strengthen handicraft industries as a supplemental source of income.

The field of employment that is most likely to expand in the near future is the business of providing recreational services. Already, the gross income from recreation in New England is greater than that from any other class of economic endeavor except manufacturing. Throughout the region, the funds attributable to tourists, vacationists, and summer home owners have played a significant part in offsetting decreases in agricultural, forestry, and manufacturing income. As the cash needs of rural families increase and as the rural nonfarm population increases, recreation will become an even more important factor than it now is in the economy of the region. Because of this, the conservation and development of New England resources will have to give more and more weight to items of recreational significance.

To sum up: The population of New England, fundamentally stable, will undergo no marked changes in composition, distribution, or employment. The most significant changes in population composition will be a decrease in the proportion of young people, a corresponding increase in the proportion of older people, and a decrease in the proportion of foreign-born. Distributional changes will effect population increases in the small towns and cities at the expense of large urban centers and scattered rural settlements. The greatest increases in employment opportunities will be in the fields of recreation, forest production, and manufacture that utilizes local raw materials. People will have to rely less upon the opportunities created by rapidly expanding markets and more upon the resources of the region and their own resourcefulness.

The Plan

Land Use

Objective.—To bring about better conservation and use of our natural resources, a land-utilization program should be adopted to the end that no land capable of producing a profitable crop shall be idle; that those farm lands which, because of poor soil conditions or inaccessibility, are submarginal for farming be withdrawn from cultivation and put to forest or recreation uses; that our 15,000,000 acres of now practically idle woodland be made to produce marketable timber on a paying basis; that erosion be minimized; that full use be made of such mineral deposits as are of sufficient quality and quantity to permit profitable extraction.

Existing Conditions.—Physical and economic factors have united to alleviate the one-crop farming problem in New England. Small farms and small-scale operations, with flexible methods of procedure, have been prevalent because topography, soil, marketing opportunities, and transportation facilities vary greatly within small areas. Moreover, reasonably favorable climatic and marketing conditions are conducive to the production of a wide variety of crops. In a few sections there are found dominant crops, but commonly there is evidence of adjustment to divers conditions as in dairy farming, the leading type of farming in New England. In this case, hillsides and poor soils are continuously in pasture, while the better soils are used to grow feed and sometimes supplementary crops. Diversification has reached into the farm woodlot, which provides a tenth of the farm-products income in New England.

Agricultural economy, particularly on small farms, depends upon the balance between cash-crop income and part-time labor income. Nearly half the New England farmers earn a substantial part of their income by work off the farm. The depression years showed a distinct return to farming, particularly for part-time operation. The area of New England farm land has

decreased from more than twenty to fifteen and a half million acres (1935), although the number of farms has not shrunk proportionally. The reduction has been economically prudent and has resulted in better returns per acre; nevertheless, even further reduction will be necessary to meet the demands of existing economic conditions.

The forested lands, whether once cleared or not, have practically all been logged, and, in at least two-thirds of the forest, the growing stock has been depleted. In northern New England, and on public forests elsewhere, there has been attained in large measure practical adjustment between the existing economic conditions and the natural forest conditions. The pulpwood-producing spruce and fir regions have readily lent themselves to this adjustment because cropping rotations are short, 30 years or less, and the owners hold large blocks. Outside the pulpwood regions the average forest holding of each owner is small, probably less than 100 acres. Because these small holdings are so scattered, the manufacturer finds it difficult to establish contact with the various owners, and the owners themselves cannot easily consolidate their holdings to operate on a sustained-yield basis. By these circumstances, forest enterprise is heavily handicapped. At present, New England forest land is producing only one-fourth as much marketable wood as it is capable of growing, yet forestry is the most intensive type of land use feasible on about 75 percent of the area of the region.

Mineral resources have never attained primary importance in New England. Nevertheless in a number of localities, intensive mineral extraction has supported vital local industries. The granite, marble, slate, and mica deposits are well-recognized commercial assets and, in combination with other rock, clay, and gravel products, they contribute substantially to the economic life of the region. In Vermont, quarrying constitutes the principal industry. Since New England mineral deposits are commonly believed to be of little present value, there has not been any complete listing of them. Extensive data on their character and coverage should be gathered, although the fact that deposits are often hidden by a blanket of glacial till may make research somewhat difficult.

Needs.—The abandonment of the poorer soils in New England and the selection of crops suitable for disposal in the local markets have been in part adjustments to meet emergencies and in part the result of guidance by agricultural leaders. The continuance of this guidance must be relied upon to enable the farmers to keep pace with future marketing developments. Experience has demonstrated that habit and custom are fallacious guides in choosing successful crops; and there are definite indications, such as the popular reception given to the county land-use-planning committees, that farmers

welcome qualified advice and cooperative analysis of farm problems with a view to adjustment to soil and market conditions. Outstanding among the adjustments that should be anticipated is a further reduction of the present area of tillage and pasture land by perhaps as much as one-fourth. This will simply continue the reversion of inferior or depleted soils to forest.

Part-time farming is a logical adjustment and deserves encouragement wherever leaders agree that the practice fits into the local economy. Complete subsistence farming, an ideal intriguing to some, rarely exists, since individuals desire so many of the auxiliary comforts not obtainable except through cash outlay. Part-time farming, however, is eminently practicable wherever tillable soils can be found near dependable sources of supplementary income.

Soil-erosion and soil-conservation problems, although acute only in certain sections of New England, demand recognition and action to prevent both inconspicuous, insidious sheet erosion and the more spectacular river-bank erosion from destroying valuable and irreplaceable assets.

Mineral industries will find revival in the development of new uses rather than in rehabilitation within the present fields of use. Mineral resources must be surveyed and listed, their properties analyzed, their uses indicated, and finally their commercial value determined.

The less intensive land uses, forestry, recreation, and wildlife, do not, in spite of recent improvements, measure up to their economic and social possibilities. As both forestry and wildlife management depend on sustained yield at a low cost per acre, costs must be kept low by relying upon inexpensive methods of controlling natural forces and conditions. Such techniques are tested and proven slowly, and seldom lend themselves to spectacular demonstration. This inevitably results in a slow increase in public understanding and application of these methods. Other deterrents to the application of improved methods of forestry and of wildlife management are the handicap, in most of New England, of forest ownership in small blocks; the lack of any assurance that a long-term investment will be protected by reasonably stable market prices at the time the crop becomes salable; and the fact that, although the forest-fire menace has been greatly reduced, that of insects and diseases has not been so successfully checked.

There is acute need of some means of materially improving the forests in private ownership. Each of the three types of forest land in New England requires a different method of attack: Farm wood lots (7,500,000 acres), small commercial woodlands (10,000,000 acres or more), and large commercial forests (about 10,000,000 acres).

Owners of large commercial timberland are primarily

interested in informational programs, fire, pest, and disease protection, and the execution of the national forest survey in New England. Farm wood-lot owners can be helped through the Extension Service. The ground work for intensive activity has already been well prepared in most New England States, but many more extension foresters are needed throughout the region. Finally, the most baffling problem is that of reaching the small block owners, who hold more than one-third of New England forests but who usually live at some distance from their woodland and are not easily stirred to action.

The management of forest land according to principles of sustained yield cannot be successfully accomplished in New England until there has been developed a method of consolidating the administrations of many small forest properties to gain the needed continuity and uniformity of operation. These working circles, as the forester names them, should be established as geographical areas within which the timber produced is earmarked for certain woodworking mills. Application of the working-circle control of sustained-yield practices wins for the forest owner a steady and dependable market for his timber, and for the people in the vicinity continuous and stable employment.

Recommended Action.—Diversification of agricultural crops is desirable in this region and, therefore, should be facilitated by such subsidies as conservation payments so long as they do not exceed the benefits from permanent improvements to the farm. Agricultural production can also be guided by continuing such activities as extension work, land classification, and county land-use planning.

Rural well-being and economy of town government can be improved by applying such rural-zoning principles as can be adapted to New England conditions. This may require the development of a system wherein the State prepares the rural zoning map and ordinance and submits them to the town for approval before they shall become effective. In the instances where municipal economies can be quickly realized by resettlement of remote families, State or Federal funds for this purpose should be available to the town, which can repay the loan from a portion of the savings realized.

Forest taxation should be revised, but a revision based only upon the problems of the forest owner will be unfair to other taxpayers and may unduly curtail the income of rural towns where there are large areas of forest. Therefore, the vitally important forest-taxation question must be approached through an exhaustive study of the entire tax system and of the effects that reduction of annual forest taxes would have upon the revenues and administration of rural towns. It is possible that a State or Federal bond issue could provide funds for the operation of a municipal

government until the forest yield or severance taxes were being paid steadily enough to make the municipality self-sustaining again, and eventually to permit repayment of the sums advanced.

Private ownership of forest land should be given encouragement commensurate with efficient production of wood crops. Inevitably, future forest crops will be protected by reasonable public control of private cutting operations, either by State or Federal programs. At the same time, more intensive efforts must be made to bring into efficient production the many small woodland holdings and to make better marketing outlets available. A system of governmental leasing of private forest land has been suggested as a means of achieving this; conservation payments have also been mentioned as a possible means of attaining the same objective. Both methods, however, are unwieldy.

Meanwhile, some woodland owners have turned to a cooperative method of administering forest properties, a method that has been encouraged by governmental agencies. Such cooperatives usually perform the important service of finding and holding markets for wood products and also advising the owners how to practice forestry. While active groups in New Hampshire, Massachusetts, and Connecticut are vigorously attacking State-wide forestry problems, adaptation to local conditions is essential, and cooperative or other local procedures, based on owner responsibility, need to be adopted throughout New England. These may be carried out by groups working under the guidance of State-wide agencies or by such groups as the county land-use-planning committees. In some places these committees have already installed improved forestry practices, and they may become the most fitting intermediaries to work with the owners of farm woodlots and of small commercial forests.

Any organization which promotes private forestry will need to supplement its activities by issuing publications that give in simple form the rudiments of forest management. This practical instruction must be explicit, for it is the owner who, if he reads and applies the precepts outlined, stands to gain or lose. Vague theories confuse the forest landowner. He prefers plain facts based on actual forest-management experience in New England. Then he can see how closely the advice can be followed in dealing with the conditions prevalent in his own locality.

The importance of topographic mapping and geologic surveys has been too little appreciated by State governments. Hence the burden of such projects, if they are to be executed, rests largely upon the Federal Government. Consequently, the Federal Government must increase its percentage of Federal subsidy, particularly in cooperative geologic surveys, unless interested groups within the States can find more

effective ways of convincing their legislatures of the common sense of underwriting the cost.

Recreation

Objective.—To increase opportunities for recreation for residents and visitors and to develop commercial recreation, efforts should be made wherever practicable to combine with agricultural, forestry, and water resource uses the development of recreational possibilities; adequate public camping and bathing facilities should be provided within easy reach of all urban centers and recreational resorts; historical and scenic sites and all roadsides essentially rural and scenic in character should be protected from harmful exploitation and defacement; the highway system should provide adequate and direct access to all important recreation areas and a system of less direct tourways should provide attractive pleasure routes; picnic areas should be developed at convenient intervals along both; wood and waste lands and water bodies should be so managed as to assure the reproduction of wildlife in numbers sufficient to encourage hunting and fishing and at the same time preserve all native species.

Existing Conditions.—It is well known that New England contains within a day's drive a myriad of points of scenic attraction. But the fact that seacoast, lakes, and mountains are interspersed with an attractive countryside is of greater importance, since this makes travel between spectacular points of interest a pleasant ride through varied surroundings dotted by farms, forests, or villages, making a pattern of endless mosaic.

These assets draw 3,000,000 people a year from other parts of the country, who spend here about half a billion dollars annually. This is one-fifteenth of the money spent in the United States for recreation. The present volume of this business, rated as second in importance in New England, has been attained by the slow but steady growth of commercial ventures catering to the recreation seeker.

Commercial recreational business is largely a part-time activity, because the summer season lasts 3 months or less. Increase in the numbers of auto camps and wayside stands, spread of tourist homes and boarding houses, and sporadic improvement of existing facilities are the only signs of modernization in travelers' accommodations provided by commercial enterprise during the past 20 years. Meanwhile, most of the recreation travelers have turned from the railroads to the highways, a trend belatedly checked by provision of faster, air-conditioned trains. The highway traveler now goes touring, makes short stops, and more often than not chooses inexpensive accommodations. As a result, the summer hotel owners have found their veranda rocking chairs empty, week-long and month-long guests rare, and perforce have welcomed a more mobile

clientele, ever restless to move on. Farmers and townspeople in favorable locations compete with hotels and resorts for this overnight trade.

When on the highway, many recreation seekers have found that rural areas and remote lakes and ponds are as interesting as well-known resorts and perhaps more restful. Therefore, the still rapidly growing recreation business has become widely dispersed, comprises many small establishments, and is a significant source of employment in rural sections.

At all seasons, man-made as well as natural spectacles prove dependable crowd-gathering attractions. Such spectator interest draws crowds to races, fairs, carnivals, and theaters, to mountains, seashores, and lakes. With the automobile for a vehicle, the spectator goes touring to view many scenes, and makes short stops that end as soon as local attractions pall.

Tourists have found that the appearance, and at times the capacity, of main access roads make them unattractive as pleasure routes. Seeking by ways for more interesting scenery and for more leisurely travel, the tourist has discovered that many especially attractive pleasure routes, or "tourways," are inadequately marked. Likewise, the increased number of travelers threatens to overcrowd points of noteworthy scenic or historic interest and makes imperative the furnishing of additional picnic areas, camp grounds, bathing areas, and other facilities.

The seasonal influx of highway travelers has prompted, in many cases, unwisely conceived or low-grade commercial enterprises that destroy the scenic values inherent in an unspoiled country side.

Needs.—While a great deal of effort is and should be expended in serving the money-spending tourists from outside the region, probably too little is expended in better serving the recreational needs of the large urban populations within New England. In the studies of parks, parkways, and recreational areas conducted by the National Park Service in cooperation with the various States, the recreational resources and needs of New England have recently been thoroughly explored for the first time. The cities have made progress in the provision of in-town playgrounds for children, but it is safe to say that adequate recreational opportunity for both youth and adult has not been attained in any city.

The public interest plainly justifies the provision of recreational facilities near urban centers to make outdoor recreation possible for large population groups. Elsewhere throughout New England, well selected and properly located open spaces will benefit the general public and the commercial recreation interests as well. Naturally, facilities will vary to fit circumstances, but especial concern should be accorded picnic, bathing, boating, and scenic sites, winter sports, hiking, hunting, and fishing.

Adequate direct access to sections of recreational importance should be provided by continuous development of the through-highway system, and notably by construction of the coastal freeway from New York to Bar Harbor. Along the roads approaching recreational areas, the scenery and the attractiveness of the countryside require control so that needless eyesores cannot endure. Routes through the best of New England scenery will be most easily followed if clearly marked as tourways. Rural parkways planned to fit the topography are the most effective publicity for local scenic assets. A continuous rural highland parkway, touching the Berkshire, Green and White Mountain ranges and continuing through the Maine wild lands past Katahdin to eastern Maine, could well be laid out as a national parkway. If such a parkway were built and supplemented by attractively developed State parkways and other access highways, and if the many scenic roads already available were well marked, an ideal road system for satisfying the human desire for travel would then exist in New England.

The establishment of public parks and the equipment of other open spaces with recreational facilities can be an asset to commercial interests if properly guided. On the other hand, so long as commercial interests do not know what policies will guide the establishment or future expansion of parks, there is real uncertainty concerning the competition which the public park may offer. This complicated problem must be adjusted to fit local conditions, but there is need of a clearer park-development policy, which is as vital a factor as the determination of suitable fees or insistence on landscaping.

Recommended Action.—Selection of land for public recreational use can readily conform to land-use plans. The result is a happy combination of improved land use coincident with provision of improved public facilities for picnicking, camping, and water sports. Particularly in New England it is usually possible to choose park or picnic areas where other intensive use is impracticable and occasionally where land is tax delinquent. Moreover, in the large park areas there is an excellent opportunity to apply multiple-use principles by developing simultaneously recreational, wildlife, and forestry resources. Along the coast, prompt control measures can preserve for public use and enjoyment enough beaches and other seashore features before intensive private occupation usurps them.

Many features of the recreational program can be administered best by State authorities, particularly where policy adjustments are desirable in view of local commercial recreational enterprises. Each New England State, when working out its own recreational programs, can profit by adopting certain of the methods followed by one or another of the other States in establishing and operating State parks.

Since New England has a real asset in its potential forest crop, park administration or recreational use should prohibit selective cutting of merchantable trees only in small areas especially valuable for recreation.

Marked tourways, rural parkways, and improved access roads must receive constant attention if recreational assets are to be developed continuously so that they may draw desirable summer visitors.

The provision of picnic facilities at many widely scattered points, which is emphasized in Connecticut and Maine, is worthy of review and adaptation to local conditions in other States.

Scenic control of the roadside is possible by means of freeway legislation in Connecticut, Maine, and Rhode Island. Another way of gaining this control is by the purchase of easements, as along Route 100 in Vermont. But additional means must be found to protect scenic assets along the highways. Perhaps rural zoning can be introduced promptly enough to keep the country charms from deteriorating; otherwise immediate control lies in the passage of State legislation to guard scenic roadsides through application of strip zoning.

In the future, wildlife resources will be controlled more effectively because of progress in scientific management. Proper application of these management methods should be encouraged and conducted in accord with principles of multiple use. More particularly, fish and game laws in contiguous States will be revised so that they harmonize; and where it is desirable to have special hunting and fishing areas, as in Connecticut, such areas will be selected with increasing regard for other land uses. Public hunting and fishing areas, either State-owned or leased, will usually either be selected in locations where multiple use is feasible or located on little-used or waste land. Meanwhile, private owners should be urged to improve the wildlife on their lands and to reimburse themselves by charging fees to hunters and fishermen.

Water Use and Control

Objective.—To assure effective use and control of our water resources, reservoirs should be constructed near the headwaters of the Connecticut, the Merrimack, and, where feasible, of other major rivers, and should be supplemented by local protective works and flood-plain zoning; pollution should be eliminated where the cost is not out of proportion to the benefits; steps should be taken wherever practicable to conserve low-water flows and to develop water power; water-supply reservoirs and their watersheds should be managed on a multiple-use basis to the maximum extent compatible with maintenance of purity of the water supply; steps should be taken to insure maximum steady returns from commercial fisheries.

Existing conditions.—New England is a well-watered

region with an annual rainfall in excess of 40 inches, almost evenly distributed throughout the year. Severe droughts rarely reduce the annual precipitation to less than two-thirds of its normal amount. Destructive floods are frequent, though irregular, visitants; they are associated either with tropical hurricanes that impinge upon the shores of New England in the fall of the year or with spring thaws that discharge the winter snow from the uplands of the region.

In the development of its water resources, New England pays the penalty for early settlement and industrial exploitation, which employed mechanical rather than electrical transmission of power, and for the establishment of textile and paper-making industries that utilize large volumes of water for washing or scouring purposes and so pollute the streams. Both these types of development have crowded factories and municipalities into stream valleys and augmented the hazards of floods.

About 90 percent of the population is served by public water supplies. The numbers of ground-water and surface-water sources are about equal, but about three-quarters of the population use surface water. Only about 10 percent of the water works include treatment by filtration, because surface supplies are obtained, with rare exceptions, from sparsely inhabited upland areas.

Most of the large communities in New England possess sewerage systems, but many have inadequate or no treatment. These and the industrial developments are responsible for the high degree of pollution of the larger streams and tidal estuaries. Damage to both commercial and recreational fisheries, which is assuming large proportions, is traceable to lag in adoption of such remedial measures as treatment of the polluting waters.

While there has been a strong shift in the development of power from individualized works that serve isolated or communal industries to central hydroelectric and steam stations, it has been difficult to liquidate early investments in water power without displacement of industries. Rural electrification lags.

The control of destructive floods as a planned engineering undertaking is of relatively recent origin, following in the wake of a series of disasters of unusual magnitude. The conservation of water for regulation of low-water flows has, so far, been almost entirely for the purpose of power development and not for the improvement of navigation, recreation, or abatement of dry-weather pollution.

On the whole, existing conditions are attributable to individualistic exploitation of water resources. Aside from its historical basis, this state of affairs is due also to the lack of coincidence of political and hydrological boundaries. Few catchment areas of any importance

lie wholly within one State. The mechanism for co-operative efforts between States has always been clumsy, and laudable undertakings have often foundered.

Needs.—The most obvious need in the development of the water resources of New England is the construction of new projects for and adaptation of existing works to multiple use. Beginning with the projects of greatest magnitude, namely the flood-control works that are now under construction or in contemplation, provision should be made for coverage of all economically sound services: Flood control, power, water supply, low-water regulation, and recreation. The responsibilities associated with water use and control should be assigned neither upstream nor downstream in their entirety. Development should be well balanced. Flood control, for example, is attainable (1) by upstream storage of flood waters in reservoirs, (2) by improvements of river channels and flood-protection works, and (3) by zoning of the flood plain. Adherence to the first method alone would place the major burden of change upon upstream areas; adherence to the last two would impose it downstream. In a similar manner, pollution control by interception of waste waters and discharge into the lower river reaches or into tidal estuaries should be balanced against construction of treatment works at or near the point of waste production.

Reasonable and full development of the water resources of New England must be integrated into the general plan for the region. Water supplies are affected in quality and quantity by land use and affect land use in their turn. Similar interrelationships exist in connection with recreation, industry, services and utilities, transportation, preservation of wildlife, and control of mosquitoes and other nuisances.

Recommended Action.—Comprehensive river development is predicated upon the establishment of a properly constituted valley-wide agency that will initiate, or allocate, or reconcile the various proposed uses of the water resources that lie within a given drainage basin. An important function of such an agency is the development of a farsighted, comprehensive, and flexible river plan and the fitting of projects into the plan with due regard to changing needs and requirements.

Because of the great variety of ways in which the water resources of a region touch upon the life of the region, the spheres of activity and authority of different governmental agencies must necessarily overlap. While it might be possible to centralize activities in one valley authority, it is doubtful whether such centralization would be desirable. What appears to be needed is a mechanism that will facilitate consultation between the different agencies, Federal, State, municipal, and private, and will also establish procedures for assigning to the appropriate agency or agencies responsibility

for the construction, operation, and financing of a given project.

The National Resources Planning Board's drainage basin committees, and such interstate organizations as the Interstate Commission on the Delaware River Basin and the Interstate Sanitation Commission (New York, New Jersey, and Connecticut) are examples of the type of agency needed, although they do not yet have the responsibility for coordinating multiple uses and apportioning benefits which will eventually prove necessary.

Industry

Objective.—To stabilize and encourage productive industry appropriate to New England, there should be constant improvement of transportation facilities, service by other utilities, distribution methods, living conditions, taxation, and community interest; such industries should be attracted that large industrial centers will have diversification of types of industry, and small industrial towns will have industry that is peculiarly adapted to local conditions; decentralization of industry and development of local handicrafts and other part-time activities should be encouraged.

Existing Conditions.—New England is predominantly an industrial area. In recent years, its developmental efforts have been directed primarily at regaining the industrial supremacy which it enjoyed for about a century. That industrial employment be maintained at its present level, or even a higher one, is essential to the future well-being of the region. Trends indicate that this will be possible only if the present transition results in the establishment of types of industrial activity better suited to New England conditions than those which have recently experienced such sharp declines. Then again, the industrial security of the region will require more diversification and more decentralization than now.

New England industry was founded on such local resources as water power, pure water for processing, and wood; it prospered because of proximity to large markets and because the industrialists of the region exhibited enterprise and skill. Today, most of these factors have changed: Small water-power installations are often not economical; many of the streams are polluted; the timber supply has been greatly depleted; marketing conditions have been completely changed through the advent of improved transportation methods; in many respects, owners and operators have failed to make the adjustments necessary to keep abreast of the times.

Where timely adjustments have not been made, small, one-industry villages have suffered severely when economic conditions have attracted their sole means of support elsewhere, or when changed customs

have reduced to almost nothing the demand for the particular commodity manufactured. In the same way, large industrial cities and even regions have suffered tremendously from the effects of such significant changes in the industrial structure as the migration of the cotton industry to the South. Yet, where management has been alert, these blows to New England industry have been averted, or healed, by substitution of new types of manufacturing.

Needs.—It is likely that there will be further industrial migrations from New England. To avert calamitous results in such instances, efforts should be bent toward wider diversification of industry in all industrial centers throughout the region. The need today is not to attract more industries of the types that are already established so much as it is to attract or develop new and varied types of industry.

One of the most critical industrial situations today is created by the scores of abandoned factory buildings now on the market. In many cases, those buildings offer excellent quarters for new industry, and all efforts, short of outright subsidy, to get tenants for them should be encouraged. But in many, perhaps more, cases, buildings are so old, so out of repair, or so ill adapted to modern industrial requirements that they cannot rightfully be expected to serve further industrial use. To establish new industries in these buildings would be to invite trouble. One of New England's greatest needs in the field of industry is to "write off of the books" and destroy the obsolete vacant industrial plants.

Efforts to establish industry on what turned out to be weak foundations have produced difficulties. Attraction of an industry by some sort of financial inducement when there are no fundamental assets to hold it has often been temporarily successful but has rarely resulted in permanent benefit to the community. Industrial development or rehabilitation will depend increasingly upon specifically favorable local conditions, such as availability of raw materials, ready access to markets, availability of supplies of skilled labor, and provision by the community of needed services and facilities.

A phase of industrial activity which has received too little attention is the development of handicrafts and small home industries as both part-time and full-time occupations. Widespread encouragement of this type of work through educational training and through organization of market outlets is needed to turn spare time, latent skills, and unused resources into supplemental sources of income.

Although New England industry has long depended on the abundance of skilled labor as one of its chief assets, the region is no longer so outstanding in this respect. Vocational training, including some appren-

tice work, is greatly needed if the skills which are so important to New England are to be maintained. At the same time, research, the development of new industrial methods, and the manufacture of new products, which were so characteristic of New England in the past, must not lag if the region, deficient in most natural resources needed by industry, is to retain its high place in the industrial field.

Recommended Action.—Inventories of industrial assets and opportunities, similar to those already made in some localities, should be made for all New England. Such inventories should place more emphasis on local resources, physical, social, and financial conditions of the community, and opportunities for future development than on vacant plants and past industrial performance.

Vocational education and opportunities for apprentice training, such as are now available in many industrial centers, should be made more generally available throughout the region. In the less populated areas, State subsidy of such training courses as part of local school curricula may be necessary. Training of this sort should be easily accessible to adults, as well as to youth.

Industrial research, based on and integrated with the inventories of natural resources recommended in the land-use section, should be continued with increasing emphasis by development agencies, educational institutions, and the industries themselves. This research should aim to develop more efficient ways of carrying on existing lines of manufacture as well as to discover new products that will make use of natural resources or industrial byproducts.

If industrial promotion work is to bring lasting results, a larger proportion of available funds should be spent on improving the basic qualities and environment of potential sites, and less on calling attention to the mere existence of the sites. To attract new or to hold existing industries, New England towns and cities must offer good living conditions, modern public services, adequate transportation facilities, and sound governmental and financial structure.

Housing

Objective.—To improve living conditions, the present deficiency in decent housing should be overcome by the provision of at least a quarter of a million new housing units; in general, new urban housing should be accompanied by slum clearance; in rural areas, where such services as water supply, electricity, improved roads, and schooling can be made available within the limits of economic practicability.

Existing Conditions.—Housing difficulties in New England relate rather to the quality than to the quantity of the homes. Where there is demand for new

housing units, aside from replacements, it is usually in connection with industrial expansion due to national-defense contracts. Urban housing, except in some of the mill cities and towns, is probably equal to or above the United States average. Many cities, especially these mill centers, do, however, contain slums of the worst type from the standpoints of construction and sanitation.

Rural houses in New England, on the other hand, are among the best in the country, in both construction and maintenance as well as in equipment with such services as water, telephone, and electricity. Exception must be made in the case of the colonies of tar-paper shacks that have sprung up in many places, largely in the last decade.

In suburban areas, housing is generally good. Nevertheless, small lots offer some difficulties, chiefly where rows of multiple dwellings erected on narrow lots have added tremendously to the problems of sanitation and fire and police protection. Again, the community tax base has been seriously disrupted in some suburban areas where the location of colonies of small bungalows on isolated back roads has made the cost of providing services unreasonably high in proportion to the amount of taxes they produce. The large, ornate houses of the last half of the nineteenth century are sources of embarrassment in many suburbs. People who can afford to maintain them will not live in them; and situated as they usually are, they cannot be remodeled for other than single-family use because of zoning restrictions.

Needs.—Adequate housing for the lower-income groups is one of the most pressing needs in New England today. Construction costs are so high that it is virtually impossible to provide new dwelling units for really low rentals, and many of the existing units are definitely substandard.

In urban areas, there should be gradual but steady abolishment of slums. Where replacement of eliminated units is necessary, new housing should be so located, built, and protected that the passage of a few years will not result in the formation of another slum.

Measures are needed to prevent further spread of ribbon development of rural slums along main highways. In isolated rural areas where a decent livelihood under today's economic conditions can no longer be obtained from the land, there is likely to be need of resettlement, preferably along improved roads; following the resettlement, the original property should probably be allocated to recreational uses.

Suburban housing should be protected from unwarranted encroachment by business and industry. Better control of subdivisions is desirable, not only by review of individual plats, but also, if possible, by prevention of oversubdivision during boom periods. In addition, there is need to curb developments in architectural

style and construction which might render livable homes obsolete in the eyes of the public, for houses which the public shuns add to the burden of unnecessary depreciation in taxable real estate.

Recommended Action.—To remedy deficiencies in housing for those in the lower-income brackets there should be:

1. A thoroughgoing attempt to provide really low-cost housing on a self-liquidating basis:

True low-cost housing cannot be provided by building housing units singly or in small groups under present construction conditions. The success of such a self-liquidating program will depend on the extent to which modern methods of mass production are utilized. To permit this, building codes in many places must be liberalized.

2. A further trial of public subsidy of low-cost housing:

The extent of public subsidy necessary is largely determined by the degree of success of the self-liquidating program. It is obvious, however, that housing for people in the lowest income groups will have to be subsidized on some basis if they are to have decent homes. And it is probable that unless present building practices, labor conditions, and prices are radically altered, some form of subsidy must be made available if home ownership or adequate housing is to be provided for those who earn no more than the standard minimum wage.

3. Mortgage funds for long-term loans:

An indispensable factor of a low-cost housing program is encouragement of home ownership by those in a position to benefit by it. Loan funds should therefore be made available on terms adapted to the financial resources of those with small incomes.

4. Slum clearance:

No program to improve conditions in low-cost housing can be considered adequate that does not provide for the removal of definitely substandard housing. This should be undertaken as fast as new units can be constructed.

5. Decentralization of low-cost housing:

Since industrial areas in New England usually consist of a central city and several satellite towns, low-cost housing developments should be distributed as widely as possible to avoid overbuilding any one municipality with small houses and hence creating an unreasonable tax burden on other real estate in that municipality.

General acceptance by cities and towns of the principles of zoning, subdivision control, and modernization of building codes until they include some control over architectural design constitutes an important means of improving housing conditions. Establishment of local planning boards and adoption of official master plans will furnish the mechanism for making

these principles effective. Enabling legislation for the preparation of official plans is needed in some of the States. Where protection against unwarranted subdivision is not afforded by an official map, subdividers should be required to install certain necessary services on their properties. The solution of housing problems in rural areas where the land is submarginal for agriculture will require some form of rural zoning.

Proper location of housing units is just as important as design and construction if property values are to be maintained under changing economic conditions. New housing needed by reason of sudden expansion of industry, as in connection with some of the present national defense contracts, should be related to the permanent economy of the locality.

Transportation

Objective.—To obtain a satisfactory regional transportation system, the different modes of transportation, highway, rail, water, and air, should be improved and integrated to the end that all traffic is carried by that type of transportation which is best suited to carry it; a system of airways should be developed according to plans that provide for class 3 fields or better at all existing air transport stops and at other large population centers, for class 2 fields at secondary population centers and all important recreation centers, and for local airports wherever carefully prepared plans show such facilities will be needed for private or commercial flying; a region-wide highway system should include a coastal limited way running from the New York-Connecticut line into Maine with branches up the Connecticut and Merrimack Valleys and to Cape Cod, a network of through secondary routes designed to accommodate tourist traffic as well as to provide local access, and improved farm-to-market roads serving all rural areas well suited to year-round residence.

Existing Conditions.—The lines of New England railroads lie almost wholly within the region. For the most part, they do not compete with each other, but some of them do have as rivals the alternate routes, with lower freight rates to western points, that are provided by lines of the Canadian railways that extend into New England. Passenger travel on the New England roads, although declining rapidly, is still well above the United States average. Freight traffic is predominantly terminal in character; the length of haul is much below the United States average. A major problem is the lack of balance between freight moving into and out of the region, for the tonnage of imports is about five times that of the exports.

This same lack of balance is evident in water-borne commerce. While 10 percent of the Nation's shipping goes through New England seaports, only 10 to 15 percent of the tonnage handled is for export. Domestic

commerce, mostly in imports of fuel, accounts for the bulk of the traffic by water.

Air transportation development in New England is governed primarily by the small size of the region, with three-fourths of the people living in the three southern States; by its location in the extreme northeast corner of the United States; and by its rough terrain and rigorous climate. There are at present about 100 airports and landing fields in the region, but only one-quarter of these are capable of handling air transports. Federal airways with all-year transport service extend from Boston to New York, to Albany and the West, to Montreal, and to Bangor and Aroostook County points, while there are prospects for an early extension to points in the Maritime Provinces. In addition to this all-year service, several routes are flown during the vacation season. The many harbors and inland lakes make New England ideal for seaplane operations.

While New England has long been noted for its good roads, very few modern motorways have been constructed. Most of the main highways, dating from colonial or early republic times, are still in the process of modernization. As a result, while pavements are usually adequate, grades and curves are often excessive. There are many traffic bottle necks because, although southern New England is one of the densest traffic areas in the country, trunk highways pass through the business centers of most of the cities and towns along their routes, and intersections at grade with other heavily traveled roads are numerous. Traffic congestion is augmented by auto parking in business centers, by ribbons of commercial development on the roadsides, and, during the summer months, by a huge volume of recreational travel.

Needs.—Transportation is one of the vital needs, not only for domestic prosperity but also for national safety and defense. Further development of all forms of transportation must be in accord with military needs and should conform to military standards where necessary. Units of transportation systems that are considered important links in national defense, and which are now substandard from a military viewpoint, should be the first to be improved.

In addition to being adapted to the needs of national defense, transportation in New England should be so developed that each type of carrier will bear the traffic for which it is best adapted. To this end, the railroads, if they are to be put on a permanent basis under private ownership, need contraction through abandonment of unprofitable branch lines and services into systems that can operate profitably in semicompetition with the partially subsidized air and highway traffic. To provide properly for air travel, it will be necessary to expand aviation facilities. Likewise, the highways need general improvement and modernization, and special high-



FIGURE 1.—A Plan for New England Airports

ways and parkways must be designed expressly for through motor travel.

Better and more convenient terminals and transfer points and administrative integration will be needed to facilitate coordination of service by rail, water, air, and highway. The ideal to be striven for is to provide the shipper with a complete service, door to door, in which the goods will be moved by whatever means are most expeditious and economical. It does not matter to the shipper what means of transportation his goods are shipped over so long as he gets good, fast service with no risk of loss. Integration of service and facilitation of transfer from one means of transportation to another can eliminate short-haul railway freight and uneconomic long-haul trucking with its consequent high demands upon the highway system.

To permit extension of scheduled air transport service, New England needs approximately 35 to 40 airports of class 3 rating (3,500-foot runways). To provide for feeder service and recreational flying, 75 more airports and landing fields of class 2 rating (2,500-foot runways) will be needed. The Boston airport, a natural base for trans-Atlantic operations, needs improvement for both land and sea transports.

More than 6,000 miles of highways in New England should be rebuilt, widened, or relocated to provide adequately for the passage of mechanized army units. More than 500 bridges need to be widened or rebuilt. Grade separation and the by-passing of many cities and towns are needed to eliminate traffic bottlenecks. To provide for efficient motor travel as well as for the free movement of troops, New England needs a system of strategically located modern motorways, the first unit of which should be the coastal limited way which has been proposed from New York and the South to Maine.

Recommended Action.—In order that transportation in New England may develop along sound economic lines, there should be:

1. A comprehensive plan which will indicate the approximate part each type of transportation will play in the future.

2. A guide for allocating Federal, State, local, and other responsibilities for future transportation development.

This is particularly needed in the case of air travel. The establishment of a policy by which airports that could logically be considered parts of the public transportation system of the region would be eligible for development with Federal and State funds in much the same way that highways are now improved with Federal aid is necessary to provide adequate air terminals. Standards for the development necessary on secondary airways and the determination of the extent of Federal and State responsibility in their

establishment will extend air travel to sections of New England now inadequately served.

The regular Federal-aid highway development program should at first be directed toward bringing up to military standards the sections of existing roads that are now inadequate. Federal aid in the form of direct grants or loans should be sought for the construction of the new regional highways of freeway design that are so badly needed to provide for normal business and recreational travel as well as for national defense. Determination of the extent of public responsibility for providing facilities for the motor car when stopped as well as when in motion must be made applicable to specific situations before a solution of the parking problem can be achieved.

3. The enactment of legislation necessary to develop and protect modern transportation.

Proper development of transportation will be difficult until additional legislation is provided. Especially needed are:

Legislation to provide for Federal and State participation in the development of airports and landing fields on a permanent basis rather than on a work-relief basis.

Freeway enabling legislation in the States that have not already passed such acts.

Zoning laws or other legislation to control roadside development and to protect airports and their approaches.

Education

Objective.—To make New England people happier and more useful citizens, education, available to all youths and adults as well, should include fundamental types of vocational training; community centers for the promotion of literature, music, art, and adult recreational activities should be fostered; instruction in regard to local conditions, resources, planning, and other governmental problems should be included in the curricula of all schools.

Existing Conditions.—The first college, the first public high school, and the first normal school in America were founded in New England. Ever since then the region has ranked at or near the top in the field of education. Although today it exceeds the national average in the percentage of children who go to grade and high schools, in the amount of money spent upon education per child, and in facilities for caring for the blind and for mental delinquents, it has fallen behind in the proportion of pupils who attend college and vocational schools.

The New England system of town government has militated against educational progress in rural districts because it has so favored continuance of school units too small to be efficient. Yet this same system of

government has, through the intimate community life and responsibility that it fosters, developed a widespread interest in civic affairs and in the cultural opportunities that community effort can provide. Nearly every community has its library, and both the number of volumes and the circulation per capita are far higher than the national averages. The proportion of illiterates is relatively low in New England, in spite of the fact that foreign-born elements are responsible for abnormally high percentages of illiteracy in many of the industrial cities.

Because the number of children of school age is stationary or even declining in most sections of New England, it will become increasingly easy to overcome deficiencies in school equipment.

Needs.—Probably the greatest educational need in New England is the expansion of vocational education. Principally true in the rural public schools, this observation applies throughout the region, and for adults as well as for people of school age. To permit this expansion, there will be need for much reorganization of educational practices and, especially in rural areas, for substantial additions to present curricula.

If rural areas are to obtain educational benefits, vocational and otherwise, comparable to those in the city, there must be much consolidation of school units. Advantages of modern equipment, experienced teachers, and varied curricula can be obtained for rural areas only if several towns combine their resources and establish schools large enough to be efficient. The economies and advantages made possible by this practice usually more than offset the additional transportation expenses.

In some rural areas, consolidation of residence is needed even more than consolidation of schools. Costs of transporting children to schools from isolated dwellings, usually farms, are often such as to put the local school budget completely out of balance. In the many places where the costs of this transportation, plus the extra burdens of road maintenance, especially in winter, and of police and fire protection, are appreciably higher than the returns from these places in the form of taxes, it will probably be worth while to retire the dwellings from use as year-round residences. In any case, application of some such measure as rural zoning would prevent school and other costs from mounting unreasonably.

A deficiency in many school programs very nearly as great as that of vocational education is lack of instruction in the fields of local resources, local government, and citizenship. Important as may be the usual types of geography, history, and civics courses as means of familiarizing the student with Nation-wide and world-wide conditions, there can be no doubt that his future usefulness as a citizen will be enhanced if he learns more

about these subjects as they relate to definite, tangible local problems.

Although New England is singularly fortunate in the number of its public libraries, it is not nearly so fortunate in the number of its local opportunities for enjoyment of art, music, and drama. Social service enterprises, fraternal organizations, agricultural extension, and other agencies have done much to foster these types of educational and recreational activity, but there is a distinct need for more work of this sort. It may prove desirable to employ, on a State or county basis, extension workers to perform just this type of service.

Recommended Action.—Before there can be more widespread vocational training and instruction in local civics, resources, and related subjects, teachers must be better trained in these fields, more and better textbooks written and made available, and greater cooperation obtained between the schools and various local interests. Particularly needed are new textbooks which shall deal with the background and machinery of local New England government and with New England resources and their uses. It may well be within the province of State and regional agencies to make material of this type available. Certainly, planning agencies at all levels of government should facilitate cooperation and exchange of information between schools and government administrative, research, and construction agencies.

To aid in school consolidation and in the financing of new schools thus made necessary, State agencies should be granted additional powers and responsibilities, and possibly funds should be lent for school construction. Although it will probably not be desirable to enforce consolidation upon rural communities, such action may well be encouraged in connection with State educational subsidies. Certainly in connection with the allocation of State or Federal funds for aid in constructing rural schools, the possible advantages and long-range economies of consolidation should be given careful consideration. Even in urban areas, the needs and opportunities for consolidation or replacement are likely to be much more important than the need for additional facilities.

Welfare

Objective.—To provide a greater measure of social security, there should be a permanent, coordinated program in which all gainfully employed workers would have unemployment and old-age insurance; work on carefully planned projects of lasting value to the public would be the basis of relief for those unemployed who are capable of working; and public funds would be set aside regularly to act as a cushion in meeting the fluctuating needs for relief; health should be promoted by

making hospitals and other medical services easily accessible to everyone.

Existing Conditions.—In all six New England States, there are fairly uniform programs for old-age assistance, aid to dependent children, aid to the blind, unemployment compensation, and old-age insurance. However, in Connecticut there is, instead of aid for dependent children, a type of assistance administered as aid for widows with children, and in Rhode Island the program of aid for the blind was not installed until late in 1939. But even a partial picture of welfare conditions as indicated by disbursements during the fiscal year ended June 30, 1939, for these types of aid shows, for a region as small as New England, wide variations in expenditures among the States. For instance, in that year Vermont paid out only \$1,798,265, or \$5 per capita, for these categories of assistance, while Massachusetts spent for the same purposes \$57,952,433, or \$13.50 per capita. The Federal Government contributes heavily to the payments to recipients of old-age assistance, aid to dependent children, and aid to the blind. In the fiscal year ended June 30, 1939, the Federal Government paid approximately one-half of the totals of these payments in New England.

Entirely apart from the Work Projects Administration and its predecessors, which, since 1934, have assumed a large share of the work-relief burdens of the State, the amounts expended by States for "general relief, sometimes called outdoor relief, home relief, or direct relief" ranged in 1939 from \$803,367, or \$2.40 per capita, in Vermont to \$21,967,009, or \$5.10 per capita in Massachusetts. The grand total expenditure for New England for the above types of assistance was \$129,790,340, or \$15.40 per capita.

The concentration of more than three-fourths of the population of New England in urban communities accounts for most of the so-called welfare problems, including housing, unemployment, and health.

In the urban areas, natural population increase is almost negligible; hence the proportion of people in middle and old age is large. As a result, in an age when industry discards employees who are nearing the half-century mark, unemployment is high. According to the 1937 Census of Employment in the United States, 6.6 percent of the people of New England were unemployed. This is 0.5 percent higher than the percentage of unemployed in the United States as a whole, and in only one other group of States, the Middle Atlantic, was there a higher percentage of unemployed in a region.

New England is, by contrast with other parts of the country, well equipped to care for the health of its people. In proportion to its population, it has more than its share of doctors and hospital beds, and while this is largely due to the concentration of medical facilities in metropolitan Boston, the small area of the

region makes it possible for a large proportion of the people to reap the benefits of these facilities.

Needs.—New England, in common with the rest of the world, is realizing more and more that, due chiefly to technological developments, unemployment is as likely to increase as to decrease in the future unless steps are taken to prevent increase. For the older unemployed people, old-age assistance must, as time goes on, be replaced by old-age insurance, lest the tax burden for outright assistance become so heavy as to upset the balance of the entire tax structure. For the younger unemployed, the present system of unemployment compensation must increasingly help to reduce the expenditures for general relief. Similarly, the present systems of sickness and accident compensation must be expanded until they can keep temporarily disabled workers off the general relief rolls.

Although it is geographically true that medical facilities are within reach of most of the people in New England, financially it is untrue for a large proportion of the population. What New England needs is an adaptation of the cost of medical treatment to the ability to pay.

The experience of the last decade should have taught that haphazard work relief trumped up in severe emergencies is unsatisfactory. The brighter side of the picture is that if work-relief programs are planned in advance, emergencies need not be severe. In the early days of the depressed thirties, the State of Vermont had opportunity to discover this, as the following illustration shows: After the flood of 1927, State and Federal Government agencies made a flood-control survey and developed preliminary plans for reservoir construction. The spring of 1933 brought an acute unemployment situation, and to deal with it the flood-control plans were translated into action. As a result, it became possible, on a few days' notice, to set 5,000 men at work on 2 great flood-control projects in Vermont.

Public and private construction should be so regulated as to mitigate the periodical booms and slumps that upset the balance between wages and markets. Otherwise, New England can never achieve the goal of having good enough homes, factories, and public buildings for all the people all the time.

Successful private business concerns have learned that they owe much of their success to the practice of accumulating sinking funds to pay their upkeep when profits are diminishing or nonexistent. Likewise, local governments, if they would avoid bankruptcy, need to accumulate sinking funds, not only to insure themselves against times of depression, but conceivably to permit some lowering rather than raising of the tax burden during bad times.

Recommended Action.—Granted that medical facilities

should be not only geographically but financially accessible to all the people, one way to make this come true seems to lie in State or Federal subsidy of hospitals and medical services, particularly those in the rural sections of New England. Another means of bringing medical treatment within range of the purses of the middle-income groups is some plan of health insurance.

Public-works construction programs, supplemented by a wisely administered system of Federal subsidy of the kind that the Public Works Administration could provide, should help to restore the equilibrium of labor and capital and then to hold it steady. The few towns and cities in the region that, to date, have projected plans for construction of public works are convinced that the procedure is sensible. It remains, then, for every town and city to develop a long-term program of construction of public works to be built if, as, and when local demands and municipal finances are sufficiently in balance to permit construction.

But when all is said and done, one remedy remains to be applied. The New England people need to shake off the depression mood and, instead of claiming Government subsidies, prove that they can stand on their own feet. Having proven that, they will deserve subsidies, but not until then. New England people glory in the history of the exploits of endurance and ingenuity of the Pilgrims. There were no government subsidies in 1620. Let the New England people prove that moral and physical courage in 1940 are no less characteristic of the citizenry than they were 300 years ago. Then shall we have public welfare, not public charity.

Defense

Objective.—To prepare adequately and efficiently to defend ourselves against invasion, our major transportation networks should be so improved that they meet not only peacetime needs but also conform to minimum requirements for defense purposes; expansion of industrial activity and of concomitant business and residential development should proceed along lines that are in harmony with normal peacetime trends to the extent that this is compatible with defense needs; accurate and up-to-date inventories of natural, industrial, and transportation resources should be kept continually available.

Existing Conditions.—As the part of the United States nearest Europe, New England is in a vital location from the standpoint of defense. The presence of many large industrial centers and of several key armament manufacturing centers makes it a doubly vulnerable target, as does the fact that 80 percent of the people live within 50 miles of the coast. However, it is equally significant that, outside of the areas of concentrated population, New England has a pattern of widely dis-

persed farms and small mill towns, places capable of accommodating temporarily large increases in industrial activity and in out-of-city residence. Moreover, since defense activities will be concentrated along the coast, it is not an unmixed evil that so many defense industries are located near the seaboard. Their products will therefore be near at hand for emergency use, and the burden on transportation facilities will be at the minimum just when it is most necessary to draft men and machines for defense.

Serving virtually all settled parts of the area, there is a network of improved roads reasonably adequate for peacetime needs, but curves, grades, bridges, and light-weight surfaces will render much of this network of little use for primary defense. The topography and land cover of the region is such that flying operations must be confined to improved landing fields, and the number of such fields, especially those capable of accommodating large planes, is very small. Railroad and navigation facilities are more nearly adequate to meet defense needs than the other media of transportation.

Because New England industries import practically all of their raw materials and fuel, they are completely dependent upon transportation links with other portions of the country, except in the case of those few types of manufacturing that use wood or other local resources. If New England is to play its part in the defense-industry picture, access to raw materials and fuel must be bettered through improvement of transportation facilities.

Of possible significance is the existence of thousands of summer homes throughout rural New England. With only slight improvements, these homes could accommodate a large proportion of those made homeless by evacuation of cities in time of threatened invasion. Many summer cottages are so located as to be readily usable to house employees in the event of emergency expansion of now small, out-of-the-way industries.

Needs.—The greatest defense need of New England today is the improvement of transportation facilities. The main highway system should be so improved that it conforms throughout to military standards; important new connecting links, such as bypasses around Boston and other big cities, should be rushed to completion; and, when these more immediate needs are met, work should be commenced on the construction of some modern, high-speed highways that will tie in, both for defense and for peacetime purposes, with a national system. First of these highways for New England should be one from New York to Boston and thence to eastern Maine, passing near, but not through, most of the region's largest industrial centers.

Second only to highways in importance are airplane landing fields. In addition to the military fields now being built, most fields now used for commercial avia-

tion should be so equipped as to be easily adaptable to general military use; and large numbers of small fields should be improved so as to be capable of handling the smaller military planes.

From the point of view of defense industry, two procedures are imperative: (1) The making of exhaustive inventories of resources, human, natural, industrial, and transportation; and (2) decentralization of industry. Because the present distribution of industrial activity already includes wide dispersion of small industries, it will be relatively easy to accomplish partial decentralization without disrupting the present general economy. Additional housing for civilians will undoubtedly be needed at certain points, particularly where such fixed industrial establishments as navy yards or shipbuilding plants must be expanded.

In accomplishing those improvements and adjustments that are demanded by defense, every possible consideration compatible with execution of the defense program should be given to anticipated peacetime needs. Particularly in the fields of transportation, where deficiencies are especially great, and of industry and housing, where much rehabilitation work is already necessary, there are distinct opportunities for defense measures to aid rather than to conflict with normal improvement programs.

Recommended Action.—First efforts toward improving the highway system should be directed toward bringing up to military standards all the weak points on principal highways. Thereafter, efforts should be divided between construction of major new highways and improvement of secondary roads.

All airports near large cities, and especially those along existing airways, should be improved so that they can handle the larger Army planes. Elsewhere throughout the region, airports of class 1 or 2, or even smaller, should be improved as soon as possible to the extent compatible with anticipated peacetime needs. Probably the bulk of Federal funds should be spent on the larger fields, while State and local funds will certainly be needed to render the smaller fields anywhere near adequate. It would appear that the spending of local funds should be confined to those fields that are approved as to size and location by State officials.

Wherever possible, in view of the emergency needs for defense production, industrial expansion should be fostered in the smaller centers and in many scattered plants. Such a procedure will certainly be compatible with defense strategy and, at the same time, it will initiate a desirable trend in future regional development. Through this procedure the need for new housing accommodations will be kept from becoming acute, since in many rural areas there is an abundance of housing suitable for emergency use.

Inventories of all types of resources likely to be of

value in case of invasion or war status should be made immediately. In most States the State planning boards are in the logical position to cooperate with State defense councils in performing this task.

Administration

Objective.—To help bring about more efficient government and a reduction in the tax load, there should be community plans and zoning ordinances; public-works programming; actively operating municipal planning boards in all cities and all except possibly the smallest towns; and adequately staffed State planning boards functioning as units in the governments of all six States, cooperating with municipal planning boards, and working together, as a regional planning agency, toward the development of a better New England.

Existing Conditions.—The town-meeting form of government in New England is of long and honorable standing, and is probably the most democratic form of local government in the world today. Nevertheless, the slight inefficiencies and lack of direction that are likely to be found in as flexible a type of government as that in New England towns have been common. Sometimes errors have been made, although the cost of paying for them has not been too great. However, government has been haphazard on the whole; it has followed development and growth rather than stimulating them; it has overcome obstacles, but has not done much to develop opportunities.

As a result, New England towns and cities have tended to be inefficient units. When growth was at a rapid pace, it was fairly easy to cover up the mistakes; but now, when growth is very slow or has stopped altogether, the situation becomes acute.

Deficiencies in many parts of a city's equipment stand out in sharp contrast to overdeveloped facilities in other parts. Overdevelopment of residence and business looms up as a conspicuous error when a temporary industrial boom subsides, or when the crop of forest timber has been stripped off and no inexpensive supply of wood is available. Again, increasing bonded indebtedness presents a distressing problem when accompanied by precipitous declines in the value of assessed property. These conditions, in varying degrees, have been more the rule than the exception. The business of government has not been run with the same amount of thrift and acumen as have most other New England businesses.

Needs.—To overcome these errors and deficiencies in government, the chief need is for the incorporation of direction or purpose into the government framework. Research and long-term guiding policy, two essentials to good business, must be given more conspicuous roles in all government units. As time goes on, it will not be sufficient to satisfy the more crying needs of the

people when and as they are forced upon the attention of administrative officials. Each State or municipality must decide what are its goals, and then work out the best means of achieving these goals.

This immediately points to the need for coordinated plans as guides to be followed in public development and for broad plans, supplemented by legal controls, to guide private development and keep it from opposing the public interest.

Recommended Action.—All States and municipalities should have, as integral parts of their governmental set-up, planning boards charged with the responsibility for preparing long-range plans for public development, for coordinating the individual plans of executive departments, and for assisting the chief administrative officials to work out efficient ways of executing their construction programs. Such planning agencies should be purely advisory in character, but should be clothed with sufficient authority and supplied with funds enough so that they may perform the necessary research and coordinative functions.

Working in close association with these planning agencies, or as parts of them, there should be agencies vested with the responsibility for exploring opportunities for economic development and employment. There is no doubt today that one of the functions of government is to encourage those enterprises upon which depends the livelihood of the people.

Not only must government encourage private enterprise, but it must also impose upon it some restrictions. Among the types of restriction most needed is that

known as zoning, the assignment of the various uses of land to areas where such uses may be carried on without being prejudicial to the public interest. In both urban and rural areas, zoning should be enforced, and should be kept sufficiently flexible so that it may conform to changing conditions. In rural areas study should be made of the possibility of having zoning ordinances prepared by State planning boards or other State agencies and adopted and administered by the town governments. It may even prove practical to relate the application of rural zoning to certain types of State aid.

Another control over private development that should be given wider application is the control of subdivisions. Particularly now, when so many municipalities have stationary or declining populations, it is important that some control be exercised not only over the location and general design, but also over the number and extent of subdivisions. Enabling legislation in Massachusetts gives to municipalities the powers that are needed. Exercise of these or similar powers should be common throughout the region.

In conjunction with the establishment of comprehensive planning as an integral part of State and municipal government, there should also be established the practice of public-works programming. An orderly programming of public-works construction, subject to the considered judgment of the administrative officials, should be tied in directly with the municipal finance program and based on long-term plans for comprehensive development.

PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
MIDDLE ATLANTIC: REGION 2, BALTIMORE, MD., 1940

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Report of the Middle Atlantic Regional Planning Office

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LETTER OF TRANSMITTAL

NATIONAL RESOURCES PLANNING BOARD

FIELD OFFICE

RICHMOND, VA.

October 5, 1940.

MR. CHARLES W. ELIOT,
*Director, National Resources Planning Board,
North Interior Building, Washington, D. C.*

DEAR MR. ELIOT: I am enclosing mimeographed report entitled "Plan for Regional Development in the Middle Atlantic States." The objectives and recommendations presented are the result of planning far from adequate and in a very preliminary stage. In addition, many phases of planning, primarily national in scope, have not been considered except in passing.

This report is the result of the cooperative efforts of all the State planning boards in the region, the regional offices of Federal agencies in the area, and our own regional office. Several conferences of representatives of the State planning boards were held prior to the compiling of the report, which now has been developed as a result of the effective collaboration of State directors, their staffs, and the regional representatives of Federal agencies. We have also received invaluable suggestions from many individuals and from our own consultants.

Very truly yours,

MORTON L. WALLERSTEIN,
Chairman, Region No. 2.

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

MIDDLE ATLANTIC STATES

Introductory

Bordering the Atlantic Ocean from Long Island to Cape Hatteras, the Middle Atlantic region contains the following States: New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. The District of Columbia is also included. Although, contrasted with New England or the Pacific Northwest, the region lacks what might be termed regional consciousness, the similarity of its urban, industrial, recreational, and seaboard problems justifies its consideration as a region, at least for planning and development purposes.

The conclusions and recommendations set forth below are derived from many sources at an embryonic stage of comprehensive planning. They are the best that can be offered, at the present time, considering the fact that no over all State, regional, or national plans are far enough advanced to serve as frames of reference for testing the relative merits of various programs. The projects listed are designed to exemplify the type of programs needed throughout the region. Many projects listed do have an individual and obvious merit not likely to be greatly altered by subsequent and more comprehensive study. The statement, therefore, is in the nature of a progress report.

Characteristics of the Region

The region's varied topography ranges from ocean barrier beaches and tidal sounds to the Appalachian Highlands and the Great Lakes. It is the most densely populated area of comparable size in the United States. Its 200,000 square miles include a total population of 36,000,000. The region is also the most highly industrialized. With only 7 percent of the land area of the Nation, it produces one-third of the industrial output, contains 28 percent of the population, and has ports which clear 40 percent of the tonnage, 75 percent of the value of the country's waterborne exports and imports. Its domestic shipping—coastwise, river, lake, and canal—amounts to 25 percent of the tonnage of the whole United States. It produces all the anthracite coal mined in the United States, 25 percent of the bituminous coal and developed water power, 5 percent of the natural gas, and 2 percent of the petroleum. Last year, the expenditures of tourists were one and a half billion dollars, 27 percent of those of the Nation. The region's strategic position on the seaboard makes it the focal point of much of the Nation's trade, finance, and

transportation, and of activities relating to the national defense.

Following industry and commerce as the primary activities of the region come agriculture and coal mining. Forty-eight million acres, 37 percent of the land area of the region, are in agricultural production, chiefly dairy, poultry, and general farming, vegetable and fruit growing, and the growing of such special crops as tobacco, cotton, and peanuts. A small portion of the region's land is used for urban development or is in swamps and tidal marshes. The remainder, over half, is in forest land and in farm land reverting to woods, unsuitable for agricultural uses by reason of poor soils, steep slope, or bad drainage. Once rich in forest products, the region is now in process of restoring its timber resources after generations of ruthless harvesting and inadequate forest management.

Mineral products are also important in the region. Coal reserves are ample for a century or more, although some of the best veins are depleted; but petroleum and natural-gas reserves are very limited. Other natural products of the region include building materials and seafood.

Industry and commerce are largely responsible for the concentration of two-thirds of the region's population in 25 metropolitan districts, each with over 100,000 population, the largest of which are New York, Philadelphia, Pittsburgh, Baltimore, Washington, and Buffalo. In fact, the population belt from New York to Washington and extending westward as far as Scranton and Harrisburg contains less than 12 percent of the region's area, but accounts for 55 percent of its population and 59 percent of its manufacturing.

Population growth of the region as a whole has paralleled that of the United States very closely, but marked differentials exist between the northern and southern parts. In the past decade, States in the region south of the Mason and Dixon's line grew in population at rates of from 10.0 percent to 12.4 percent whereas Pennsylvania, New Jersey, and upstate New York increased by only 2.7 percent or less. Although New York City together with Long Island and Westchester County increased 8.7 percent, many large cities including Philadelphia, Pittsburgh, Newark, Jersey City, Rochester, and Syracuse actually declined in population. The most rapid metropolitan population growth in the region, 43.2 percent, occurred in Washington and 5 adjoining Virginia and Maryland counties. The fact

that 1,000,000 of the region's 2,000,000 population increase in the last decade occurred in the Washington-Baltimore and New York areas indicates their outstanding importance in regional development.

Need for Planning

No part of the country has suffered more from lack of planned development, nor is any in greater need of planning for the future. Perhaps in no place is planning so difficult, since in this region improvement involves to a greater degree costly processes of reshaping severely exploited land and facilities.

Proportionate to the region's large and concentrated population and the intensity of its industrial and commercial activities is the problem of bringing about a sound and efficient industrial pattern through voluntary planning by community and public groups at all levels of government. Preliminary studies designed to present a sound picture of industrial resources for analysis and planning are being undertaken by several State planning boards in the region.

There are also the important planning problems of supplying, at reasonable cost and with a minimum of disturbance, all the facilities of an industrialized economy, including complete transportation facilities, adequate housing, recreational, educational, and medical facilities.

Land

Although the Middle Atlantic region is usually regarded as an urban region, nevertheless the land resources of the coastal States from New York to North Carolina are extremely diverse and offer a wide variety of problems.

Existing land uses for the region's 128,500,000 acres are divided approximately as follows:

	Per- cent
Urban (residence, business, industry, vacant subdivisions, railroads, roads).....	3
Cropland and pasture.....	37
Forest, woodland, and other nonagricultural rural land....	60

Generally speaking, the land problems in the region arise from (1) maladjustments in the use of large areas of rural land throughout the region, particularly in the case of farmed areas unfitted for agriculture; (2) blighted areas in urban centers; (3) subdivision of suburban land far beyond present or probable future needs. These will be treated in their order.

Submarginal Land

Surveys by the various State planning boards in this region show approximately 29,000,000 acres out of 128,500,000 acres as being problem areas. Much of this land is now being farmed, is unfit for agriculture, and is unneeded for urban and industrial expansion. Much of it is tax delinquent. Most of it is better

adapted to such extensive uses as forestry, recreation, wildlife preserves, and watershed protection.

In addition to 8,000,000 acres already in public ownership, State and Federal purchase programs have already recommended the acquisition and retirement from private use of over 15,000,000 acres. Readjustment of use of an additional 14,000,000 acres either through public purchase or limitation in private use is recommended. Specifically, the following areas of submarginal or forest land by States are recommended for public ownership or restricted private use:

	Acres
New York.....	7,000,000
New Jersey.....	2,000,000
Pennsylvania.....	5,000,000
Maryland.....	1,000,000
Virginia.....	6,000,000
North Carolina.....	8,000,000
The region.....	29,000,000

¶ Much of this land has been specifically noted in previous reports of State and Federal agencies. The New Jersey State Planning Board, for example, has pointed out the chronic tax delinquency existing in south Jersey. In this sparsely settled wooded area of over 1,000,000 acres, or 22 percent of the State, over one-third of all land was tax delinquent¹ for more than 1 year. This delinquent area amounted to 40 percent of the total rural tax delinquent acreage in the State as a whole. In adjacent farm areas, the incidence of delinquency was half to a third that in the pinelands. Most of these lands are included in the 1,000,000 acres in New Jersey definitely recommended for public purchase and multiple use as suggested above.

The New York State Planning Council also has recommended that at least 6,000,000 acres be added to the State public domain. These, again, are lands not adapted to farming or intensive human use. Forestry, recreation, watershed, and wildlife protection are the probable future uses.

While programs for handling the problem of submarginal land differ in each State, all States in the region recognize the necessity of determining the optimum use of land. The specific figures above are gleaned from reports based on widely different approaches. In each case, the areas mentioned are more likely to be the minimum than the maximum recommended for some form of public or readjusted private use.

In addition to acquisition of lands by public agencies for retirement from unsuitable use, there is increasing need that such lands as are not acquired be zoned against improper use. Unfortunately, however, the use of the zoning technique for control of rural land

¹ Rural tax delinquency in New Jersey 1929-34.

use, so effective in Wisconsin, has not been widespread in this region.

In order to bring about more sensible use of rural lands, other remedies need also to be developed, including:

1. More liberal policies of land acquisition, particularly in the case of tax-delinquent lands.

2. Control of public services and capital expenditures, notably for roads and education, according to the economic life and potentialities of rural areas as revealed by land classification.

3. Increased use of local and county planning legislation.

4. Continuance and expansion of county land-use planning programs in order to broaden locally the understanding of land-use problems and means of remedying them, including the more efficient grouping of land in individual farming units.

5. Protection of farm land and watersheds from soil erosion by improved farm and woods management practices. Soil erosion is severe in both North Carolina and Virginia and in parts of other States, particularly in certain sections of New York.

Urban Blight

The problem of urban blight is by no means peculiar to this region, but its predominately urban and industrial character renders the problem particularly serious. Although urban blight—its causes and remedies—may not be completely understood, blighted areas have certain common characteristics. Some are slum areas, hereafter more fully treated under "Housing"; some are the result of the flight to the suburbs; and others are merely due to shifts of use of property in the urban area itself.

Areas already blighted, declining, or definitely restricted as to residential desirability in 7 representative metropolitan areas in the middle Atlantic region

[Areas in square miles]

Representative cities	Approximate population, including suburbs covered	Approximate residential area	Area already blighted	Additional area declining or restricted as to desirability
Philadelphia, Camden	2,500,000	153	32	40
Pittsburgh	1,000,000	68	19	23
Baltimore	900,000	51	7	18
Buffalo	600,000	40	3	18
Rochester	400,000	40	4	24
Norfolk, Portsmouth, Newport News	300,000	33	13	15
Charlotte, N. C.	100,000	11	3	4
Total	5,800,000	401	81	142
Percent of residential area		100	20	35

But, whatever the causes, urban blight constitutes a serious menace to our cities. It must be prevented and remedied, particularly in those areas where the

municipal balance sheet shows a high incidence of crime and disease, of tax delinquency, of poor housing conditions, and very low tax income in relation to municipal services rendered.

It is doubtful if there is a city in the region, regardless of size, not infected with it. The accompanying table presents data on seven representative metropolitan areas that were selected to give a reasonably fair cross-section of urban conditions throughout the Middle Atlantic States. As the table shows, 20 percent of the residential area of these cities and their suburbs has already deteriorated to the point where it is judged to be blighted. Large sections of the blighted areas are slums.

In addition to areas already blighted, the last column of the table indicates those areas that are declining or definitely restricted as to residential desirability because of such detrimental influences as—

(a) Age, obsolescence, poor construction, or maintenance of building.

(b) Inadequate services such as transit, utilities, or schools.

(c) Excessive taxes or special assessments.

(d) Encroachment or infiltration of harmful commercial or industrial activities, or shifting population groups.

(e) Inadequate zoning ordinances, expiring deed restrictions, or an absence of influences that protect the desirability of the area as a home neighborhood.

Most of these additional areas contain the seeds of blight, although only a portion of them are subjected to those pressures in city growth that make blight imminent. The very large areas of most cities judged to be in this condition high light the importance of speedily undertaking measures to halt the spread of blight, and to preserve and reclaim those areas for healthful, enjoyable living, and as self-supporting parts of the municipal economy.

There is admittedly no panacea for the problem. Steps to reclaim blighted areas and prevent spread of blight include—

1. Rehabilitation of actual or potential blighted areas in accordance with a master city plan and improved zoning practices, applying where possible neighborhood unit principles.

2. More liberal policies of municipal land acquisition and management, encouraged by proper State laws for efficient foreclosure of tax-delinquent properties and for permitting urban authorities to acquire, hold, and dispose of land with greater freedom.

3. Taxation policies designed to encourage the best use of urban land, including downward revision of assessed valuations in many decadent districts and fur-

ther trial of land-value taxation (gradually decreasing tax rates on buildings, coupled with increasing tax rates on land).

4. Cooperative working out of neighborhood-development problems by landowners and municipal authorities, following lines suggested for the Waverly district in Baltimore by the Waverly Conservation League, Inc., in cooperation with the Home Owners Loan Corporation.

Premature Land Subdivision

A particularly malignant type of land exploitation is evident in the subdivision of land in the suburban fringes surrounding metropolitan areas, far beyond any present or even future need. Such excess platting not only leaves in its wake much tax delinquency, defaulted benefit assessments, and private financial liabilities but, even when such areas become built up, the heterogeneous design of scores of adjacent subdivisions results in no uniform road plan or provision for an economic system of utilities. In short, this patchwork plan has little suitability for public use or for the public interest. Future growth and expansion are sorely hampered, and any future uniform development is well nigh impossible.

The extent of premature subdivision and the financial ills that follow in its wake have been clearly shown by recent surveys in New York and New Jersey.

In 81 towns studied in 4 metropolitan counties of New York State, 56 percent of all vacant parcels were in arrears in tax payments, and "special district" debt, outstanding to the amount of \$38,000,000, had been incurred largely for the improvement and servicing of few land subdivisions. Thus, in New York, the costs of government in areas of excessive land platting have been increased by millions of dollars, much of it yet to be paid. The New York State Planning Council report on premature land subdivision has already led to the passage of useful legislation improving tax-collection procedures and providing for in rem action under certain circumstances.

In metropolitan and resort areas of New Jersey, prematurely subdivided lands, largely of poor quality, are sufficient to supply a million 50- by 120-foot vacant lots, one for every family resident in the State. Unoccupied land in subdivisions intended primarily for all-year-round occupancy can adequately provide for an additional population of perhaps 3,000,000 people, whereas, in the last decade, the total population of the State increased by only 107,000. Excessive costs of providing street improvements alone for New Jersey's poorly laid out vacant subdivisions would cost from \$125,000,000 to \$150,000,000. Sample studies in 9 suburban municipalities in New Jersey show that 45 percent of all vacant lots have been tax delinquent for

more than 1 year, most of them for more than 5 years. In most cases unpaid special assessments on vacant lots amount to considerably more than delinquent taxes, and very frequently total unpaid charges are greater than assessed valuations. Costs of government and debts for local improvements that should have been met by unpaid taxes and special assessments are shifted to the remaining taxpaying property. Many municipalities facing bankruptcy thus trace their financial difficulties to land booms and excess subdivision of the post-war decade.

These problems are by no means confined to New Jersey and New York, and the recommendations for these States apply likewise to other overdeveloped suburban areas, such as exist around Baltimore, Washington, Philadelphia and, to a less degree, around nearly every large city in the region. Recommended remedies include—

1. Reclamation of existing substandard subdivisions either by replatting in accordance with an over-all plan or by restoration to rural or other suitable uses.

2. Prevention of surplus and uneconomical land subdivision through municipalities taking full advantage of platting-control powers provided by law, by refusing to finance subdivision development and requiring reasonable improvement of subdivisions by the owners before supplying public services to subdivided areas, and by augmenting legislation where necessary to accomplish the above.

3. Revision of tax laws, where necessary, to insure prompt tax sale, and provide for in rem or other simplified and inexpensive foreclosure procedure.

4. Improved methods of municipal real-estate management and sale, including the permanent public ownership of lands suitable for parks, playgrounds, schools, street extension and widenings, municipal housing project, and other public purposes.

Water

The far West has been sensitive to its water problems for many years, since they were early seen to be basic to the very existence of its people. In the East, however, the people are not water-minded, although the problems of the rivers on the eastern seaboard are no less urgent and affect a much greater number of people. Outstanding problems include those of industrial and potable water supply, pollution abatement, flood control, water power, depletion of ground-water supplies, soil erosion, and recreation. These are outlined below as they affect particular rivers and drainage basins.

The Hudson River Basin Including the Mohawk Basin

The Hudson and Mohawk Rivers constitute probably the most important river system in the region, by reason



Courtesy New Jersey State Planning Board

FIGURE 1.—Suburban Land With A Blighted Future

Branded with a planless network of unneeded streets and blocks, the surroundings of this New Jersey town in the "pine area" have become an economic No Man's Land

of their location in relation to New York City and because they furnish an important water route to the Great Lakes area. Much has already been done by New York authorities toward improvement of the invaluable water resources of this river system on which the lives of millions of people are largely dependent.²

Flood Protection and Low Water Control.—This is a serious problem throughout the Hudson and Mohawk Basins, including secondary streams. For this purpose the Hudson River regulating district has planned an extensive system of regulating reservoirs in the upper Hudson watershed. This system, as last reported, provided for an aggregate storage capacity of 1,839,000 acre-feet. A high degree of relief is considered possible through the construction of this system which, by regulation and control of flow, will make possible the better use of all water resources.

Pollution Abatement.—This outstanding need is particularly evident in the Mohawk Valley, in the upper Hudson Valley below Glens Falls, and in the lower Hudson. Pollution in New York Harbor has long been a serious handicap to the fullest use of harbor facilities. New York City has outlined a proposed program to the interstate sanitation commission for sewage-treatment plants to be constructed by 1944, in addition to the \$40,000,000 already expended. In addition, there are needed sewage-treatment plants for the 26 municipalities not now supplied on the Hudson tributaries, where population aggregates almost 300,000. Industrial wastes from river cities also constitute a menace to full use of the river. On the Mohawk only 45 percent of municipalities, in an area containing 400,000 population, have even primary sewage treatment. These instances illustrate the necessity for pressing existing programs of sewage treatment in the Hudson-Mohawk system, as well as for laying plans for the further abatement of pollution.

Potable Water Supplies.—In spite of New York City's gigantic water-supply system, the largest in the world, additional requirements have necessitated the development of available sources in the upper Delaware Basin. Other possibilities suggested by the Hudson River Valley Survey Commission are the more complete utilization of the chain of lakes on the east bank of Hudson, extending from the lower part of Rensselaer County through Dutchess County.

Recreational Resources of the Hudson and Tributaries.—If further developed, these should add immensely to

the usefulness of these rivers. Recommended by various State authorities are—

1. A Hudson scenic parkway on the east bank, extending from Harlem River north to the vicinity of Albany. The west bank also lacks a scenic drive for more than a small part of its length.

2. The further development of pleasure-boating facilities and marine recreation, coordinated with existing park systems. It is estimated that nearly 20 percent of the population of the United States is within "using distance" of this body of water from New York Bay to its upper reaches.

3. Further use of canal facilities in the Mohawk Valley, and possible development of waste State canal lands from Cohoes Falls to Schenectady for a parkway.

4. Progressive stocking of the river with fish as pollution hazards decrease.

Hydroelectric Power Sites.—Possible development of water-power sites above Troy are largely dependent upon regulation of flow by storage reservoirs which would also benefit existing industries and serve to control floods. The completion of the regulating-reservoir program of the Hudson River regulating district should be expedited as rapidly as economically possible. Ultimate plan is for 16 reservoirs, with capacity of 1,839,000 acre-feet.

Lake Ontario Basins

This basin includes the Oswego, Genessee, and Black Rivers, all of considerable industrial importance. The outstanding needs of the area include—

Flood Control.—This problem, still of immediate and general importance, is illustrated by the program of the Black River regulating district, whose official plan calls for a series of flood-control reservoirs, aggregating 574,000 acre-feet and costing \$9,400,000; part of which are constructed and in operation.

Water Supplies.—Conflicting reports on water supplies suggest the need of a further thorough study. Although supplies are generally ample, there is apparently need of unifying supply systems over much of the area, including the supply for Rochester.

Hydroelectric Power.—Water-power resources in this basin and in other northern New York basins could be utilized particularly to meet peak power loads of the system proposed for the St. Lawrence River if and when developed, since this project does not provide for daily or weekly pondage.

St. Lawrence River and Its Adirondack Tributaries

Three assets dominate the use of these waters: Navigation, hydroelectric power, and recreation.

Navigation.—Navigation has always been the dominant use of the St. Lawrence. The St. Lawrence Sea-

² Specific problems and recommendations outlined are based on reports of several State and Federal agencies, including—

(1) Report of the Hudson Valley Survey Commission, March 1939.

(2) A Preliminary Survey of the Water Resources of New York State, New York Division of State Planning. Bull. 31, May 1938, and Bull. 42, June 1939.

(3) Drainage Basin Committee Reports, December 1937, National Resources Committee.

way project, together with the New York-Ontario power project, if and when completed, would supply a 27-foot navigational channel to the Great Lakes. Recent international developments have led to reconsideration of some type of navigation and power project on the St. Lawrence.

Hydroelectric Power.—The New York State-Ontario Power project to be developed in connection with the St. Lawrence Seaway project would have an installed capacity on the American side of 1,100,000 horsepower, with a yearly primary energy output of 5,000,000,000 kilowatt-hours, plus three-fourths billion kilowatt-hours of secondary energy. Auxiliary power will be supplied from Adirondack streams.

The development of St. Lawrence power awaits approval of a treaty with Canada. A plan for the coordination of power from Adirondack streams and for tying in these sources with existing distribution systems has not yet been consummated. Specific projects totaling \$277,000,000 for the St. Lawrence, and \$13,000,000 for its tributaries have, however, been studied by State and Federal agencies.

Whereas this project has been the subject of controversy, the ultimate usefulness of the St. Lawrence for water power both for electric utility service and for industry is evident, because of the immense amount of cheap power near a great pathway of commerce.

Recreation.—For the preservation of recreational values of the St. Lawrence River, especially in the Thousand Island section, a well-considered regional plan and some form of zoning control is needed. An expansion of the existing inadequate State park facilities in this area is a primary requirement in the light of rapidly increasing public use. Improved transportation and the new international bridge have made this section doubly attractive as a tourist center. The unique picturesque character of this region is of national and international importance, and large parts might well be set aside as a national park.

Champlain Drainage Basin

Recreation and flood control are the major water problems in the Champlain Basin. No specific recommendations are included relative thereto at the present time.

New York-New Jersey Coastal Drainage Basin

This basin shares with the Hudson the problems of the New York metropolitan area and includes Long Island, part of New York City, the southwestern corner of Connecticut and that part of New Jersey whose rivers drain directly into the Atlantic Ocean. Problems are largely ones of water supply, recreation, coastal erosion, and proper use of tidal marshes and coastal water areas.

Water Supply.—With no single river toward which to turn for its water supply, northern New Jersey is urgently in need of water. An integrated system of supply is now under consideration, involving two optional programs:

1. Use of the Delaware and Raritan Canal to bring water supplies from the Delaware River, and
2. Development of supply from reservoirs in North Jersey hills.

The former program has been recommended by the Governor to the New Jersey Legislature. The use of the Delaware and Raritan Canal for water supply purposes, however, would mean partial or complete loss to the State of the extremely valuable recreational potentialities of the canal property, capable of serving a large majority of the State's population. Development of supply from the northern part of the State would seem to have many long-term advantages and would not preclude the ultimate use of the canal for water supply purposes.

Coastal and Tidal Water Problems.—Rapidly changing land patterns in the New York metropolitan region call particular attention to the problem of optimum use of coastal and tidal water areas, particularly along Southern Long Island and along the New Jersey coast. Jamaica Bay illustrates this conflict between planning for industrial or recreational uses, with emphasis changing in the last 10 years to the latter use, although limited industrial development is still recommended.

There is also need of retaining lowlands in north Jersey and along the Raritan River free from residential and industrial use. Preservation of river bottoms and tidal lands for recreation and for maintenance of badly needed floodways is the suggested program offered by State and regional planning agencies.

Prevention of coastal erosion and preservation of channels are considered further under "Recreation." The many specific projects heretofore recommended by different State and Federal agencies require careful integration with over-all State plans as to probable benefits to real estate, recreation, highways, and wildlife feeding grounds.

Provision of adequate seacoast and tidewater recreation areas has progressed rapidly in the Long Island part of the basin in recent years. Needs are still far in excess of facilities along the New Jersey coast and are discussed further under "Recreation."

Other Problems.—These are illustrative of a large group of problems requiring intensive study, for which a subcommittee has been appointed by the New York-New Jersey Coastal Drainage Basin Committee.

Other problems requiring action include:

1. Ground water supplies in south Jersey and on Long Island.

2. Reduction of pollution in the New York area. The present program, if adequately financed, will accomplish this about 1944. No further specific recommendations are offered at this time.

Delaware River Basin

By reason of its location in relation to the New York and Philadelphia metropolitan areas, most of the development problems, and most of the present and potential uses, of the Delaware River are associated with one or another urban interest or activity. Fortunately, this basin enjoys the services of the Interstate Commission on the Delaware River Basin, set up through interstate agreement by New York, New Jersey, Pennsylvania, and Delaware.

The problems of flood control and pollution abatement are common to the entire length of the river—the former relatively insignificant as compared with other rivers of the country—the latter becoming more pronounced as the river reaches the more settled areas below Trenton. Otherwise, the river divides naturally into three parts, each with its peculiar range of problems and potentialities.

Above Trenton, major interests are those of potable water supply, recreation, and, perhaps ultimately, hydroelectric power. From Trenton to Philadelphia, navigation enters as a minor factor, recreational interest lessens, and potable water supply remains to the extent that Philadelphia still obtains its water from this section of the river. Industrial water needs are scattered along the entire river, but become more pronounced at Trenton and greatly increased in volume at Camden-Philadelphia and below. From Camden-Philadelphia to the bay, navigation becomes a primary concern, with fisheries becoming important in the lower river.

Assisted by State planning boards and other agencies of the four States concerned, the Interstate Commission on the Delaware River Basin has developed a number of recommendations for the basin. Further specific recommendations will result from studies now under way. Outstanding problems and remedies proposed to date are outlined below:

Public Water Supplies.—Operating under a decision of the United States Supreme Court, New York City is now engaged in a project to take 440 million gallons per day from two tributaries of the upper Delaware. Studies are now under way by the Interstate Commission on the Delaware River Basin designed to supply a factual basis for determining the question of equitable utilization of available water supplies by cities in the three States of New York, New Jersey, and Pennsylvania.

Recreation.—Recommendations for further recrea-

tional development in that part of the basin north of Trenton include:³

1. Abatement of domestic and industrial wastes, in accordance with standards for zone IV set up for the river by the commission. (See "Pollution abatement".)

2. Acquisition and development of extensive river frontage for public recreational use.

3. Improvement of opportunities for fishing through restocking and uniform State fishing laws.

4. Preservation and maintenance of portions of the Lehigh-Delaware Canal for recreational use.

5. Preservation of scenic and recreational equities along such scenic highways as New York Route 97 from Port Jervis to Callicoon and possible extension of such "Delaware Trail" southward to Trenton and below.

Pollution Abatement.—Sanitary disposal of industrial and domestic wastes of the larger cities, notably Philadelphia and Camden, is a prime need. Operating under a reciprocal interstate agreement, Delaware, New Jersey, New York, and Pennsylvania have set up minimum standards of cleanliness and purity for the river. From 1936 to 1939, several sewage-treatment plants were constructed at a cost of \$10,580,000. An estimated \$65,000,000 is needed to complete the program for abatement of water pollution from municipal wastes, on the basis of criteria suggested above, with Philadelphia and Camden recommended to contribute the largest part of the cost.

There is also serious need for reduction of industrial wastes in the main stream and in such tributaries as the Schuylkill, where refuse from coal mines (culm) tends to obstruct channels and seriously to interfere with recreational uses. A planned program of action does not exist and is badly needed.

Navigation.—Improvement and maintenance of a navigable channel to the Philadelphia and Camden port is needed as both a peacetime and defense measure.⁴

Susquehanna River Basin

With a drainage area of 27,500 square miles, the Susquehanna is the largest stream on the Atlantic seaboard. Within the basin are important industrial centers, large anthracite and smaller bituminous coal fields, gas fields, and extensive transportation systems. Sixty percent of the basin is in farms, ranging in quality from some of the finest agricultural land in the country to areas definitely submarginal for farming. The remainder of the basin, in forest and game lands, includes large areas of second-growth timber. Much of the submarginal and forested land is particularly adapted to such multiple-purpose uses as timber production, game conser-

³ Recommendations pertinent to this program are included in Delaware River Basin, the Upper Valley—Planned Development or Exploitation, a publication of the Interstate Commission on the Delaware River Basin.

⁴ In this connection, reference is made to existing reports of the Corps of Engineers.

vation, watershed protection, and public recreation. Much of it is tax delinquent and should be under some form of public ownership or control.

The more important water conservation problems of the Susquehanna Basin are: (1) Flood control, (2) pollution, (3) power development, (4) drainage of anthracite mines, (5) water and soil conservation.

Flood Control.—This is the basin's most urgent problem. In the 1935 and 1936 floods alone, property damage exceeded \$85,000,000, not to mention the number of lives lost. An extensive program for protection of cities and towns by means of levees and protection walls along the main river, and by dams, channel improvement, and flood walls on the branches is partly constructed, partly under way, and partly under consideration by the Corps of Engineers. Improved land practices offer partial solution for retardation of run-off. This program is being further developed by the Soil Conservation Service. Zoning of flood plains so as to prevent construction on such plains offers one of the best plans for protection of private lands and has been recommended repeatedly by the State planning agencies involved.

In the Pennsylvania section of the Susquehanna Basin, \$10,000,000 worth of levees and related works are now under construction by the Corps of Engineers. Additional levees to the amount of \$6,000,000 have been authorized, but this program is now being revised in the light of recent conditions. The most extensive Southern New York flood control project includes 2 reservoirs and 6 local improvements completed or under construction and 12 other proposed projects, the total cost estimated to exceed \$33,000,000. In considering questions of justification of flood-control programs, intangible social and psychological injury chargeable to floods is an extremely important factor that should not be overlooked.

Pollution Abatement.—Most of the municipalities in the basin discharge untreated sewage into the streams. The hazard of contamination has been aggravated by discharge of industrial wastes, of which the most serious are waste and culm from coal mines. Cooperation of coal producers and State and Federal agencies is now needed in stabilizing mine refuse banks, together with a progressively stricter enforcement of existing sanitary legislation, where necessary.

Hydroelectric Power.—Although river regulation will improve hydro power potentialities, and although the river offers fine future prospects for power, specific recommendations must await further study and development of markets.

Drainage of Anthracite Mines.—This is an increasingly vital problem in the lives of over one and a quarter million people, directly or indirectly affected by flooding of "drifts." Anthracite coal, valued at over \$200,000,-

000 (at the breaker), is produced yearly in the 480 square miles of the Pennsylvania anthracite region.

The drainage problem arises from past practices of allowing surface water to accumulate in abandoned workings and drain into currently operated mines. The latter are thus responsible for the drainage of the increasing number of abandoned mines. Pumping costs per ton of coal mined now range from 14 to 25 cents in most instances. This problem cannot be solved by the mining companies alone; both State and Federal aid in making a comprehensive study of the situation is needed, a study involving consideration of economic and engineering aspects. Such a cooperative investigation costing \$300,000 has been requested by mine operators. The Susquehanna drainage basin committee has recently recommended a preliminary examination to determine the advisability and the character of such a study.

Other Water Problems.—These include protection of watersheds for public water supplies and improvement of streams for recreational use. This latter will be greatly facilitated with the reduction of pollution and by progressive restocking with fish.

Chesapeake Drainage Basin

This drainage area includes the upper and lower Chesapeake, the Potomac, and the James Basins. The most important water problems are abatement of pollution, recreation, fish and wildlife conservation, and flood control. These vary in importance in different parts of the area.

Land and Water Conservation.—Studies by State planning boards and Federal agencies indicate that at least 5,000,000 acres of land in this basin are unfit for agriculture and better adapted to forestry, recreation, watershed, and wildlife protection. Protection of public water supplies, reduction of silting in river channels, soil conservation, and flood control are all related to this problem of land-water management in up-stream areas.

Studies now under way by the Department of Agriculture in the Potomac Basin are designated to present a factual basis for flood control work involving improved agricultural and silvicultural practices. In order to reduce flood damages 20 to 25 percent certain land-water conservation measures are recommended including public ownership or control of much of the low-value farm lands in the basin for forests, improved large scale timber management, flood plain zoning, improved cropping and soil conservation measures.

Sea-Food Conservation.—Both commercial and recreational fishing present serious problems in the Chesapeake and Potomac estuaries. Steps toward a Virginia-Maryland interstate compact have been taken to control shell fish harvesting. Continued efforts

along this line are needed if commercial fisheries in this area are to survive and prosper. Pollution does not seem to be serious enough to have affected oyster beds.

Pollution Abatement.—The James River-Hampton Roads area still finds this a major problem. Health, navigation, and wildlife interests are all affected. Virginia cities on Hampton Roads now are taking steps to install sewage disposal plants.

An interstate compact between the States of Maryland, Virginia, Pennsylvania, and West Virginia for consideration of the water problems of the Potomac, particularly pollution, has long been discussed and is about to be consummated.

Recreation.—With the extension of the George Washington Memorial Parkway westward above the Potomac and the opening of part of the Chesapeake and Ohio Canal for public recreational use, the development of important recreational values along the Potomac River is of immediate interest. (See "Recreation".)

Carolina Coastal Drainage Basin

The rivers of this basin, the Roanoke-Chowan, Tar-Neuse, Cape Fear, and Yadkin-Peedee, drain large sections of North Carolina and part of Virginia. Total land area is about 60,000 square miles, with a total population in excess of 4,000,000, of which 79 percent is rural and 21 percent urban. Primary development needs are:

Adequate Water Supplies.—This involves improvement and integration of urban water supplies, particularly in the rapidly growing industrial Piedmont area. New sources of supply are needed in many instances.

Pollution Abatement.—Reduction of both domestic and industrial pollution, aggravated in late years by the rapid industrialization and urban growth of certain sections of North Carolina, is required.

Recreation.—The vast area of inland sounds, river estuaries, and lakes provides a great natural resource for recreation that calls for comprehensive planning if its values are to be conserved and adequately used.

Other Problems.—In the coastal plain, the problem of gradually receding ground water tables and water supplies is intimately tied up with the need of a comprehensive plan for the undeveloped areas in this part of the basin. In coastal areas, such problems as salt water infiltration, land drainage for malaria control, protection and propagation of fish, and beach erosion are serious. Much more study of specific water problems in the coastal plain is needed before specific recommendations can be made.

In the Piedmont area, a well-rounded program of soil conservation and water utilization is needed. Both potable water supplies and industrial water needs will

be improved by cropping practices designed to retain much of the present run-off. At present, detailed plans for improvement of water supply in the Piedmont area are definitely dependent on some over-all study designed to recommend a program for land use, both agricultural and urban. While hydroelectric power has already been developed to the extent of more than one million horse power in the Piedmont area of North Carolina alone, an equal amount is still available for development when the regional market is prepared to absorb it.

Industry

Containing some of the largest industrial centers in the country, such as those in New York, Philadelphia, and Baltimore port areas, the Pittsburgh steel section, and the Buffalo-Niagara district, the region accounts for nearly 35 percent of the value of the Nation's industrial output.

Some of the major industries, such as steel, machinery, aircraft, shipbuilding, and clay products used for building, are subject to wide cyclical fluctuations in output and employment. Subject to less violent cyclical fluctuations are many other important manufactures such as paper and printing, tobacco, confectionery, malt liquors, silk and rayon textiles, and many chemical industries, especially paints, drugs, fertilizer, and petroleum refining. Clothing, one of the largest of the region's industries, is subject to high seasonal unemployment but remains reasonably steady from year to year.

Although, as a whole, the region has a rather well balanced industrial structure, certain sections, such as the Pittsburgh and Newport News areas, suffer from undue dependence on a single industry.

In some cases, industries are located to take advantage of nearby raw materials or power resources, such as tobacco in Virginia and North Carolina, hydroelectric power at Niagara, and coal and oil in western Pennsylvania. More frequently, location is governed by proximity to the great eastern metropolitan markets, wholesale centers, specialized service facilities, and pools of labor with many diversified skills. Assembly of raw materials and marketing of finished products is facilitated by good, although often crowded, highways, low freight rates of the eastern territory, and cheap water transportation by sea, lake, navigable river, and canal. Major handicaps to industry are high taxes, high living costs, and wage levels higher than in many parts of the country.

Major Objectives

A program for industrial development for any region or locality should seek to encourage a healthy, diversified, articulated, and stable industrial structure. Such a structure would create conditions favorable to better

hours, wages, working conditions, and labor relations, and would form a basis for sound long-term investments in each community in housing, commercial establishments, transport, utilities, and public improvements of all types.

¶ The Middle Atlantic States will benefit themselves and the Nation by recognizing their industries as an integral part of a national and world economy. Instead of fighting a rear-guard action to prevent flight of certain industries to the South or elsewhere, they will do well to develop markets in the rapidly industrializing South for the many products in which their industries have a large margin of advantage. Higher incomes elsewhere create wider markets for the machinery, drugs, typewriters, clothing, cigars, and cigarettes of the Middle Atlantic region.

Program

An industrial-development program for this important manufacturing region cannot be satisfactorily formulated except on the basis of careful appraisal of the industrial functions and industrial prospects of its several parts in relation to national industrial structure and world-wide economic trends and possibilities.

In Maryland, for example, detailed economic studies give evidence of reasonable diversity in the State's manufactures, and better stability than in the Nation as a whole. Collectively, her industries have experienced generally increased employment and output, and have bettered national trends by a substantial margin. Employment losses in some industries, notably textiles, nonferrous metals, and lumber products, have been compensated by gains in others such as steel, food, and leather products. Recent developments at the Bethlehem Steel and Martin Aircraft plants at Baltimore suggest that manufacturing expansion is continuing and demonstrate further Maryland's ability to make necessary industrial readjustments to keep abreast or ahead of national economic development.

Industrial orientation studies, in many respects similar to those of Maryland, are under way in New York. The Pennsylvania State Planning Board has carefully analyzed emerging industrial opportunities and recommended the stimulation of those industries that bid fair to form permanent assets of the State's manufacturing economy. New Jersey and Virginia are also carrying forward industrial analyses of varying types.

All States in this region would do well to carry on studies along these lines, parallel to national industrial studies, with free interchange of information on sources, methods, and analyses. Cooperative work in developing such industrial studies might pave the way for subsequent planning and complementary action by public and private agencies on the regional and national as well as the State and local, levels.

Pending such studies by all States concerned, and possibly by the Federal Government, the following program is recommended:

1. Revision and reasonable equalization of industrial taxation and subsidy policies through interstate conference with participation by all levels of government.
2. Elimination of uneconomic differentials in freight rates, and wage levels between the northern part of the region and southern areas.
3. Formation of local industrial planning councils recognizing the mutual interests of manufacturers and the community. Such councils should encourage industrial-plant investments only when—

(a) Comprehensive investigation of facts reveals reasonable ability of industry to become a permanent community asset.

(b) Location of plants promotes desirable community development.

4. Particular recognition of the serious problems of the anthracite-coal areas of northeastern Pennsylvania and the bituminous-coal areas of western Pennsylvania, Maryland, and southwestern Virginia. These areas contain large populations, major portions of which are economically dependent on a single mineral resource. Due to the mechanization of mining operations and the depletion of the most easily mined and better quality coal reserves, present high unemployment will probably increase rather than decrease over a long period, unless new or supplementary economic support can be found either in the coal areas or elsewhere. Cooperative action by mining, industrial, commercial, agricultural, forestry, and other interests, private and governmental, is required to minimize some of the serious economic problems.

Transportation

In the Nation's most industrialized region adequate facilities for rapid movement of both people and freight are most important. Add to this the fact that this same area is most important for movements for defense purposes, and we find that mobility is a paramount necessity. Consideration must therefore be given to highways, railways, waterways, and airways.

Highways

The following highway needs in the region are not meant to be all-inclusive. They illustrate specific examples of representative types of highway improvements for which recommendations have already been advanced.

As perhaps is common to all heavily developed sections, and in spite of the great amount of money spent upon them, the highways of the region have undergone and are still experiencing an unprecedented

rate of obsolescence. Hindsight shows that this obsolescence and present resulting inadequacies in the highway system are due chiefly to (a) underestimate of increase in vehicular traffic, (b) lack of planned integration of highway locations with the development of contiguous areas, (c) failure in appropriate instances to develop highways on the freeway principle, (d) failure to acquire rights-of-way of sufficient width, and (e) failure to protect highway frontage against deleterious development of a nature diminishing both highway safety and utility.

Such as they are, improved highways now exist to serve the principal point-to-point requirements of the region. But, while the basic system of major highways is virtually complete, the service remains inadequate. Many of the existing highways need to be modernized; relief highways must be constructed to supplement or take the place of the more overcrowded and the more obsolete of the existing roads; and all major highways need protection against the uncontrolled development and use of abutting frontage, such as is to be achieved through zoning, the establishment of set-back building lines, and the regulation of land-subdivision activities.

As State- and interstate-highway plans are developed, and new construction is undertaken, increasing emphasis should be placed upon the freeway and parkway type of road—this not only in the interests of safer and more pleasurable driving, but as an element in improved capacity, individual and public economy, and reduced rate of obsolescence.

State and sectional plans for the region are not yet sufficiently developed to permit the listing of any considerable number of needed new interstate highways of assured merit.

Atlantic Coastal Highway.—Among the several current proposals, however, is one which appears especially deserving of commendation, at least in principle—the proposed coastal highway from Washington to New York, with extensions north into New England and south into the Southeastern and Southwestern States. Because of the area to be served, this proposed highway is likely to be the most important ever to be built in this country. It is eminently fitted for both peacetime and defense purposes. Properly designed and properly located, it will become the backbone of the highway system of the east coast. As a facility for efficient mobilization of military forces, and for the rapid movement of troops and munitions, it would be indispensable.

Of the alternative proposed locations for this road—one generally heading directly to and through the principal cities en route—the other placed near but inland from the principal cities, the latter appears to have a number of important advantages, including those of economy and reduced vulnerability in case of war. It is believed that by use of roads leading into

and out of principal centers of interest along the way, the “inside” location will prove as serviceable, if not more so, than the city-to-city location.

Baltimore-Washington Freeway.—A second urgently needed link is the proposed city-to-city highway between Washington and Baltimore. This is planned to include a 400-foot right-of-way and will be built on the “freeway” principle. The cost to Maryland alone will be at least \$7,000,000. Much of the right-of-way will be on Federal-owned land, with cost of acquisition reduced to a minimum. This road is planned for completion in the near future.

Washington-Annapolis Freeway.—A similar parkway is needed between Washington and Annapolis as recommended in the Baltimore-Washington-Annapolis area plan. The very considerable recreational traffic between these cities warrants integration of this highway with existing and proposed park and forest reserves as outlined in the above Baltimore-Washington-Annapolis area plan.

Pennsylvania Turnpike.—The freeway principle in highway design has already been applied to the Pennsylvania Turnpike. This toll road, nearly completed at a cost of over \$70,000,000, stretches 160 miles through the Appalachians, linking Harrisburg and the Pittsburgh industrial area. It is estimated that over 2,000,000 vehicles yearly will use the turnpike by 1945. The value of this type of highway for interregional and transcontinental traffic suggests the need for an early extension of the road to the Philadelphia industrial area and its ultimate tie-in with the proposed coastal highway. A prorated cost of the extension would approximate \$39,000,000.

Other proposals are noted in considering parkways, under “Recreation.”

Railways

The region has few rail freight transportation problems peculiar to itself other than those growing out of the convergence of many competing lines upon New York and upon other principal ports. Particular problems include those of an improved coordination of terminal facilities and the elimination of unnecessary duplication of facilities, in the interests of economy. The Middle Atlantic region shares with the rest of the country the need for modernization of rail transportation facilities, including rolling stock. The East feels this need more, perhaps, than some other sections where modernization of rolling stock in particular is more advanced than in the industrial East.

New construction needs appear to be limited largely to improved terminal facilities to expedite transshipment, and service tracks for new industrial areas. The tendency, and probably the need, is for reduction rather than extension of track mileage.

Unwarranted freight-rate differentials between the eastern territory and the southern territory unduly restrict industrial opportunities in North Carolina, as in States farther South. Further equalization in ton-mile rates seems desirable.

Additional passenger rapid-transit facilities are proposed for some suburban areas as from Philadelphia into Camden County, and from Manhattan Island into metropolitan New Jersey, but these projects do not seem to be imminent; their need may be obviated by improved bus transportation; and there is considerable question as to whether, in stimulating still further concentration of population and of central-city activities, they are wise in principle. If there were no other guide, the current experiences of Europe are sufficient indication that excessive centralization of either population or industry is socially and physically hazardous.

Waterways

This region contains four major seaports and numerous other important ports and harbors. Large-volume shipping includes widely dispersed pleasure boating by means of countless small craft, much inland commercial traffic as on the several canals and navigable rivers and bays, as well as naval and commercial seagoing activity.

Commercial Traffic.—Except for the proposed controversial St. Lawrence deeper waterway project, most of the basic present port and channel requirements of the area have been, or are in the process of being, met. Most of the remaining requirements of oceangoing traffic are those of channel improvement and maintenance. The one proposed intraregional waterway project of major proportions, a ship canal across New Jersey connecting the ports of New York and Philadelphia, would be so costly in proportion to its utility as to be of doubtful economic justification.

Pleasure Traffic.—Perhaps most neglected in the region have been facilities for pleasure boating, apparently increasing in popularity. Designed in considerable part to serve such boating interests is the recently proposed project for deepening the inland water channel along the Jersey coast to 12 feet, to connect with a proposed canal across Cape May, providing a further link in the inland waterway extending now from the Delaware Bay to Florida. The inland channel improvement for the Jersey coast has much merit, but the proposed 12-foot channel depth may be somewhat excessive. It is doubtful if potential use by pleasure boats requiring channel depths greater than 8 or 10 feet is sufficient to warrant the expense of the deeper channel. Extensive commercial use of the bays that comprise a considerable part of this waterway would be seriously detrimental to the primary utility of these waters, that of recreational use.

There is, however, some need for improvement of channels leading to smaller harbors on the lower reaches of the Potomac, and along the Maryland, Virginia, and North Carolina coast, particularly for recreational traffic, but also for local commercial purposes. The former is considered later under Recreation.

A problem allied to channel silting is that of eroding beaches—severe along parts of the Jersey and Carolina coasts. In determining the value of levees, jetties, and other coastal protective measures, it is extremely important that such coastal-improvement program be considered carefully in the light of State and local development and land-use plans.

Water-borne versus Highway Transportation.—Wherever in the region minor channel improvements are proposed, they should be carefully scrutinized for their effect upon present and prospective land-transportation convenience and costs, since increasingly dense development in many parts of the region brings out the old conflict between the water-borne and highway transportation. Many waterways of little and decreasing use, usually small tributary streams, still have the right-of-way over much more important and voluminous highway traffic. To the already disproportionately great costs of channel improvement and maintenance, in many such cases, must be added the extra costs of bridge construction that will not obstruct water traffic. Such conflicts are probably most frequent for the lower tributaries of the Delaware River, and are noticeable along the New Jersey coast.

Airways

Size of population, volume of commercial and industrial activity, strategic position on the eastern seaboard and overseas air terminals at New York and Baltimore all contribute to the large importance of air transportation in the region. Shorter average-travel distances and the extent and convenience of other forms of transportation in the region result in less per capita commercial intraregional air mileage here than in some other parts of the country, but the total volume of air traffic is great and rapidly increasing for this region, as for all others, and the need for additional land facilities is pressing in many places.

Illustrative of the many deficiencies in the region is the fact that the removal of the New York metropolitan commercial terminal from Newark to North Beach, and the shift of terminal in the Philadelphia area from Camden to the Philadelphia Municipal Airport, leaves the whole State of New Jersey with no air terminal for passenger or express transportation. Access to air terminals from this State is across the full breadth of the city of New York or Philadelphia. This and similar situations elsewhere in the region discourage air travel for distances less than several hours' duration.

With the assistance of State departments of aviation, State planning boards, and other State agencies, the Civil Aeronautics Administration has now nearing completion a national airport plan. Major objectives of this plan include:

1. Duplication of airport facilities in areas of most intense use to allow for the greater separation of commercial-transport and private and training uses, two activities that cannot be safely or satisfactorily mixed, and to provide for future contingencies;

2. Additional port facilities to accommodate the current national training program;

3. Well-distributed regional airports to serve groups of neighboring communities and concentrated industrial areas.

In its present form, the airport plan now being drawn up proposes the construction of 300 new civil airports in the region, in addition to about 150 airports now in operation. Furthermore, many of the existing airports are recommended for extensive improvements. Those given first priority include 8 major class 4 airports, 3 to serve the New York metropolitan area—North Beach, Floyd Bennett, and Newark—and 1 each for Philadelphia, Baltimore, Washington, Pittsburgh, and Buffalo. In this connection, there should be noted the newly completed LaGuardia Field at North Beach, and the Philadelphia Municipal Airport at Hog Island, both now in operation, and the new Washington Airport nearing completion. In addition, there are over 75 class 3 fields proposed for first priority, requiring the same minimum standards as class 4 airports, except that landing strips and runways need be only 3,500 feet instead of 4,500 feet long. Nearly 150 class 2 and class 1 fields are also given first priority.

Although indicating the large volume of airport development work needed, this plan has not yet been sufficiently integrated with other local and regional development factors to provide in all respects a satisfactory frame of reference for safe initiation of an extensive airport construction program. Further, while peacetime aviation facilities should serve many defense purposes almost equally well, State and Federal plans are being adjusted to meet the requirements of defense objectives.

Chief drawback to the rapid advancement of airport construction, especially in the metropolitan parts of the region, is the continued great degree of dependence upon local and municipal development, maintenance, and operation. Airports are essentially regional, if not national, in service. Because of their physical requirements, they frequently must be located in small outlying municipalities, too poor and too little concerned to finance them.

Recreation

The large number of cities in the middle Atlantic region, particularly in the New York-Washington population belt containing 20,000,000 people, greatly accentuates the need for outdoor recreational facilities. Recreational resources are abundant in the forested Appalachian backbone and on seashore, lakes, rivers, and bays. However, public parks, forests, and other areas are inadequate to handle the serious recreational need, particularly of large metropolitan centers, while, with the exception of recent New York developments, very little public beach is available, especially near crowded cities. Exploitation of natural features and overcrowding of existing facilities require early action in order to preserve a greater portion of these resources for public use.

The major areas of recreational importance, the larger State and Federal reservations, together with the largest cities of the region are shown in the map on page 144. Specific proposals referred to herein are also shown. Many smaller State and Federal parks, forests, and other recreational attractions are omitted here because of lack of space and not necessarily because of their lack of importance, particularly to local communities.

Public expenditures by State governments in the region for parks, forestry, and fish and game conservation in 1937 total \$7,500,000 and average 21 cents per capita, throughout the region. The importance of recreation in the Middle Atlantic States is indicated in part by the retail expenditures of recreation travelers, estimated to total \$1,500,000,000 in 1939—27 percent of the total for the Nation.

Deficiencies in Recreational Facilities

Recreational development of the region must go forward along many lines. Current deficiencies, while variable in degree and intensity for different parts of the region, are evident in all classes of facilities at all levels of government. A recent study of New Jersey, by the State planning board, discloses that the urban recreational facilities of that State meet less than a third of present need. In Pennsylvania, the State planning board recommends an increase in the public park land of from 43,000 acres to 187,000 acres. Virginia, once the mecca for small-game hunters, by neglect of its game population, now loses much of the profitable business and pleasure of small-game shooting to less conveniently located places. Except in New York State, which excels in State parks and parkways, the region has few conveniently placed, large, nonurban recreational areas and no public seashore parks quickly accessible and properly developed to serve the crowded

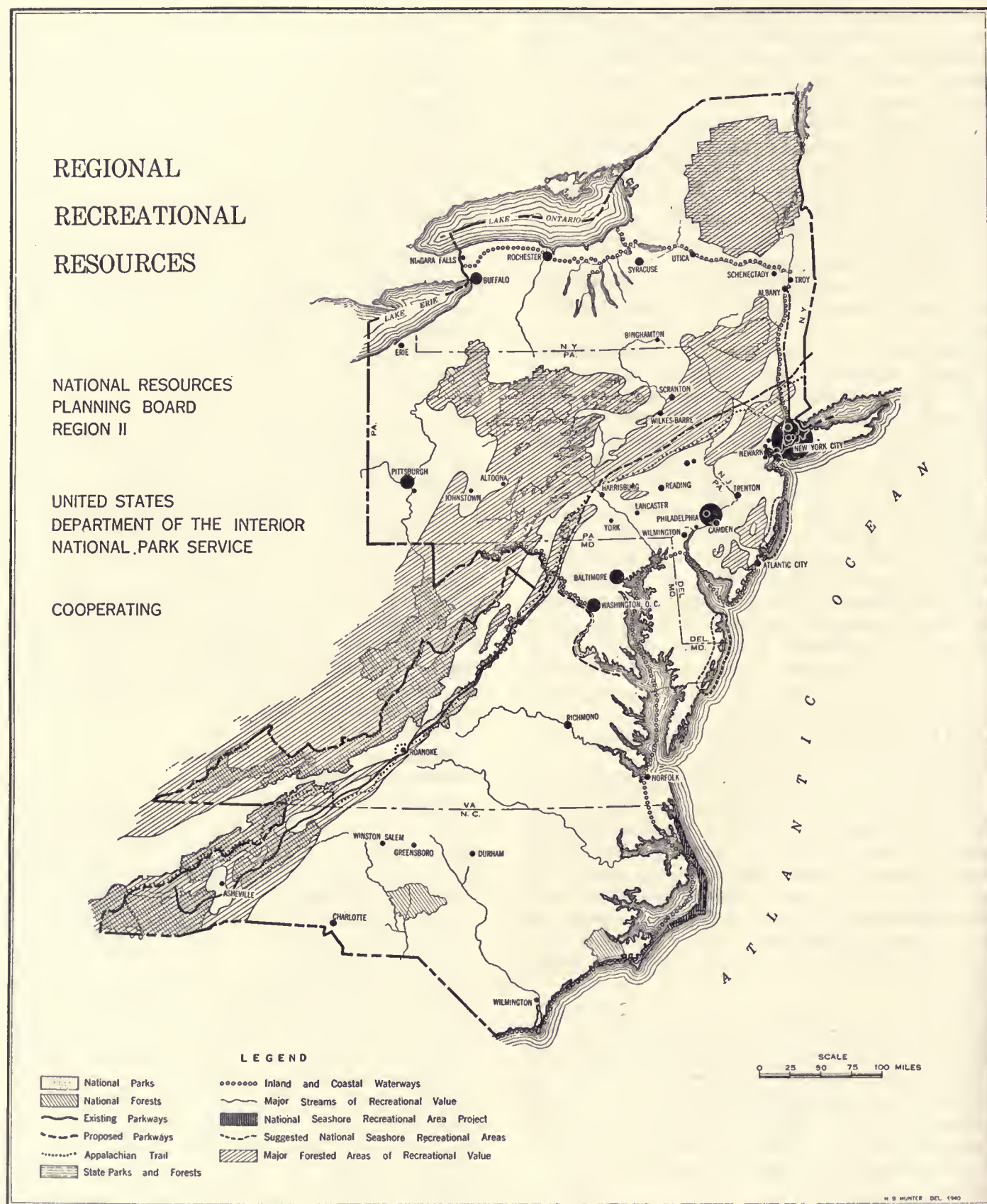


FIGURE 2.—Regional Recreational Resources

hinterlands in New Jersey and Pennsylvania. In this connection, there is need for acquisition of beach and water-front areas by all levels of government. The States in the region have approximately 3,300 miles of seacoast and Great Lake frontage, of which only about 135 miles or 4 percent is in State and Federal ownership. Adequate access by the public is almost entirely lacking in the case of most of our large cities. Advances, however, have been made in the New York City area and on Long Island and in the case of State and Federal park developments in Virginia and North Carolina. Studies by the National Park Service indicate that at least 10 percent, appropriately distributed, of the frontage of our seacoast, Great Lakes, and major streams should be in public ownership.

Generally throughout the region, most strategically placed rivers and streams are so severely polluted as to have a much diminished recreational value and, in some instances, none at all. New York State and Pennsylvania are considerably advanced in the matter of State-forest holdings. Virginia and North Carolina lead in national-park and forest lands and improvements. But in some degree, there is a recreational lag in all States of the region in all classes of facilities. However, rapidly maturing park and recreational plans now in process in several of the States, and by Federal agencies, including the National Park Service, should shortly produce more specific and inclusive recreational-development plans and programs for this region.

Particularly in suburban and rural areas, greater attention should be given to the possibility of utilizing consolidated schools and grounds as community recreational centers. In general, school grounds throughout the region—urban, suburban, and rural—are totally inadequate to meet the needs of ordinary school recreation. Often little can be done to remedy this situation. In rural and suburban sections, however, a little foresight can generally provide adequate playground space adjacent to the school at relatively little expense. The amount of land will vary in each instance. Twenty acres is recommended as a minimum in the case of high school and rural consolidated schools. There is a wide variety of recreational uses to which such recreational centers could be put, as shown on the accompanying plan. These include the common intensive games, playground and nursery school activities, and adult recreation.

Historic areas of national and regional importance not shown on the accompanying map include 31 historical sites under the jurisdiction of the National Park Service, in addition to many administered by State, local, and private agencies. Outstanding examples include Colonial and Morristown National Historic Parks, Gettysburg National Military Park, Valley Forge, and Mount Vernon. Mention is made in this

connection of the Historic Sites Act of August 21, 1935, which provides that the Federal Government may enter into cooperative agreement with State and local groups for preservation and use of historic sites, regardless of whether ownership is vested in the United States.

Proposed Recreation Developments

Many recreational needs in the region are clearly a responsibility of cities and counties. These include adequate neighborhood recreation facilities, both urban and rural. The following proposals of regional importance are the result of studies undertaken by such agencies as State conservation commissions and State planning boards and the National Park Service. The park-, parkway-, and recreational-area study being conducted by the National Park Service, in cooperation with States, under authority of the act of June 23, 1936, has been instrumental in forwarding the State recreational plans of many States. A number of recommendations below are particularly emphasized in these State studies. The list below illustrates some of the major proposals:

1. Development of large outlying parks and reservations in the neighborhood of our eastern cities, in order to carry out recreational aspects of interstate regional plans for such metropolitan areas as New York, Philadelphia, Baltimore, and Washington. As an example, immediate attention is directed to the proposed Hackensack Meadows (N. J.) State Park to provide badly needed open space for the crowded north Jersey cities. Half the population of New Jersey and the tremendous reservoir of people in New York City are within 10 miles of this site.

2. Establishment of adequate seashore recreational opportunities. Major proposals include public seashore areas in New Jersey and south of Delaware Bay, in addition to the Cape Hatteras National Seashore Recreational Area project in North Carolina being undertaken by the National Park Service. In addition, further acquisition of public beach frontage by cities and counties—possibly outside their own limits—is also to be encouraged.

- (a) Best remaining sites adequate for such development in New Jersey are stretches of virgin beach north and south of Barnegat Inlet. Both areas are considered appropriate for inclusion in a suggested "national seashore" by the National Park Service. Particularly recommended for purchase and development as a State park by New Jersey conservation and planning agencies is Island Beach—11 miles of unspoiled coast just north of Barnegat Inlet.

- (b) Authorization for Federal acquisition of large portions of the 70 miles of coast stretching from Cape Henlopen in Delaware through Maryland to

Asateague Island in Virginia is now before Congress (H. R. 9718). This stretch of coast contains excellent recreational reserves which will undoubtedly be needed in the near future. By reason of their potential service area, extending over several States, both of the above projects would appear to be logical subjects for Federal development or Federal aid.

(c) Proposals for Maryland include badly needed public beaches on Chesapeake Bay serving Baltimore and nearby metropolitan areas.

3. Development of public forests, watershed protective areas, and submarginal land-purchase areas discussed under "Land" for extensive recreational use consistent with other purposes. Such areas as the upper Delaware River Basin and the southern Jersey pine barrens with 1,000,000 acres recommended for public acquisition have relatively high recreational value, due to their character and availability to large metropolitan centers.

4. Development of specific river, canal, and mountain parkway projects such as—

(a) The extension of the George Washington Memorial Parkway from its present proposed terminus at Great Falls to connect with the proposed Blue Ridge Parkway extension in the vicinity of Harpers Ferry; and from Mount Vernon to the George Washington Birthplace National Monument. This project has particular merit in the light of rapid expansion of the Washington metropolitan area.

(b) Blue Ridge Parkway extended from Skyline Drive through Pennsylvania to New York and to New England, integrated with existing and proposed recreational areas in each State.

(c) An extension of "The Delaware Trail"—a proposed scenic highway generally paralleling the Delaware River from the vicinity of Trenton to Port Jervis.

(d) Utilization of the Delaware and Raritan Canal property of New Jersey and appropriate adjacent areas for a "recreational way" if not required for water supply purposes. Recent acquisition by Pennsylvania of the scenic Lehigh-Delaware Canal for park purposes exemplifies the type of use to which out-dated canals may be put.

5. Improvement and preservation of the recreational values of highways, as recommended under "Highways" in this report, with special application to the proposed coastal highway and the Maryland project. In this connection, there is needed a much more adequate system of roadside rest and picnic areas, located possibly 20 to 30 miles apart. In highway as in recreational planning, much more consideration should be

given, in certain instances, to the highway as a "recreational way," involving sufficient right-of-way for bicycle paths, riding trails, hiking trails, and water recreation where highways parallel rivers or canals. Many individually small but cumulatively great recreational opportunities are lost in this connection because of lack of integration between highway and recreation plans.

6. Further improvement of the fish and game population of the region, in recognition of the fast increasing popularity of the related sports and of both their recreational and commercial potentialities, with special emphasis to be placed upon pollution abatement (see "Water") and the restoration of fish and game life in the most depleted areas, stocking of interstate streams, and more adequate regulation of the taking of salt-water game fish.

7. Adequate provision of facilities for camping, hiking, bicycling, skiing, and allied winter and summer "action" sports. These show a tremendous recent increase in popularity and should be provided for in State and regional recreational plans and in the specific projects noted herein.

8. Preservation for recreational use of appropriate historical and archaeological areas. National monument and national historical park projects in this category include those at Cumberland Gap, Virginia; Saratoga, New York; and the estate of Patrick Henry in Virginia.

Housing

Throughout the Middle Atlantic region, it is conservatively estimated that at least a million and a half dwelling units, 15 percent of the total, should be replaced. Real property inventories conducted in 1934 and 1936 show that in New York City and Philadelphia 14 percent of the homes lack indoor toilets; in New Jersey 25 percent of the urban dwellings need major repairs; and in Norfolk 34 percent have no bath facilities.

The Need

Because the cities in this region are among the oldest in the country, because many of their slum districts were built from 40 to 70 years ago, before the era of adequate housing or health codes, because rapid city growth has encouraged high speculative land values in residential areas outside of central business districts and adjacent to outlying subdivisions, and because building requirements and costs are high, this region faces particularly difficult obstacles in attacking its housing problems. Nevertheless, local housing authorities in many of the larger cities in the region have begun to provide decent housing for a small portion of the low-income groups, totalling 85,000 dwelling units

already constructed, under construction, or under loan contract with the United States Housing Authority. However, 20 cities of over 50,000 population in the region do not even have a local housing authority.

In very few cities north of the Potomac, where over 80 percent of the region's population live, have new homes been built by private enterprise within the economic reach of families earning less than \$1,000 a year. Approximately a third of all families fall in this group. Unless public funds for housing these low-income families are provided much more liberally than in the past, or unless large-scale low-cost housing can be made more attractive for private capital through lowering of urban land and building costs, a considerable portion of urban families will continue to exist in unsafe and unsanitary dwellings in submarginal social environments. With this great need existing for the last decade, it would seem that private capital cannot profitably fill that need or it would have done so.

Meeting the Need

Bearing the above in mind and pending release of 1940 census data on housing conditions the following suggestions are made:

1. Each urban center in the region should have a housing authority.
2. New housing for low-income families should be constructed at a considerably more rapid rate to cope effectively with the problem. Federal funds for loans and grants to local housing authorities should be available in large amounts.
3. Housing plans should be integrated with city plans through review of location, design, and rent levels of housing projects by local planning and zoning authorities as well as by local housing authorities.
4. Continued attempts should be made to attract private capital to the field of low-cost housing through lowered land, building, and financing costs.
5. Dwellings shown to fall below reasonable minimum standards of safety, sanitation, light, and air should be demolished or improved at least to meet such minimum standards as rapidly as practicable.
6. While housing conditions of rural families in many sections of the region need to be improved, such housing needs should be carefully studied in relation to social, economic, and land-use trends. Rural housing programs should be coordinated with agricultural land-use programs and rural land plans.

Education

The States in the Middle Atlantic region spend over half a billion dollars a year on primary and secondary public education. More public money is spent for education than for any other public service. Each of the States north of the Potomac spends more per pupil

than the average for the Nation, with current expenditures in New York, New Jersey, and Delaware over \$100 annually per pupil.

Some Facts of School Planning

Although this region has some of the best educational plants and programs in the Nation, in many areas an excessive price is being paid for relatively inferior public education service, and it is doubtful if, in the region as a whole, there is any public function more unplanned than the public-school system. In New York and Pennsylvania together, there are still 10,000 one-room schools. An extensive inquiry by the New York State regents reported 1,288 one-teacher schools with an average daily attendance of 10 or less, and 245 of these with 5 or less pupils. When a school has 5 or less students, the cost per pupil is 4 times the average, and twice the average when there are from 6 to 10 pupils in attendance. The New York State Planning Council has shown that schools situated in submarginal areas or areas recommended for farm abandonment are generally much more costly on a per-pupil basis than those on better land, because of the lower average daily attendance. In the 20 one-teacher school districts in submarginal areas of Tompkins County, N. Y., for example, per-pupil costs averaged \$162, with 87 percent of this amount provided through State aid. To a greater or less extent, the same situation exists in most submarginal rural areas in the region.

The Pennsylvania State Planning Board reports that, due to the smallness of local units of school administration, there is a lack of educational opportunity throughout most of the State. Two thousand two hundred and sixty-four school districts, or 87 percent of the total, are too small to maintain, with any degree of economy, a high-school program that provides an adequate curriculum. New York State recommends that its 7,000 districts be combined into a few hundred large enough to support adequate educational programs economically. Reorganization of school districts undertaken in coordination with a policy of submarginal land purchase would provide better education per dollar.

In New Jersey, studies by the State planning board indicate unnecessary duplication of high-school facilities, due in many cases to the ambition of each of the many small municipalities to have its own local high school. Regional consolidation in future high-school construction programs would frequently provide economy in service and generally improved instruction facilities.

In Virginia, the State planning board, at the request of the State department of education and of local school districts, makes studies of pupil distribution and transportation systems for existing schools. Against the background of submarginal land studies and county

highway plans, recommendations are made for school abandonment, consolidation, and revised transportation systems for pupils.

In North Carolina, the State supports a uniform 8 months' school system, with provision for supplementary appropriations by individual school districts, if desired. A school consolidation plan has been in effect for at least a decade and one-teacher schools are now rare. The State supplies bus transportation for every school child needing it and has more school busses and bus mileage than any other State in the Union.

Decline in School Enrollments

Rapidly falling birth rates since 1920 have resulted in a decline in grade-school enrollments in the region, as well as generally throughout the Nation. This is particularly true in urban areas and is just beginning to be felt in city high schools. In Richmond, for example, the white high schools enrolled 42 fewer students in September 1940 than a year before. Disregarding possible migration, it is estimated that 10 years from now Pennsylvania alone will have a quarter of a million fewer young people, and the five States in the region north of the Potomac, a half million less children of grade-school age. The result of these trends, however, is not necessarily a decline in the need for new school facilities. In New York City, although there are more seats than pupils in the city as a whole, some of the buildings in lower Manhattan are half vacant, while schools in new outlying sections cannot provide enough seats. In New Jersey, many school plants are obsolete and substandard in regard to proper daylight for each desk, fire resistance and protection, and play space; furthermore, classes are being held in halls, basements, and rooms without adequate teaching and laboratory facilities. Such conditions are common in many parts of the region and require modern school building programs to replace obsolete structures and to provide for school consolidation in the interests of economy and more adequate educational opportunities. Such programs should be based on careful estimates of school population trends by age groups and by localities, with due allowance for probable future development.

Much more attention should be given to advance purchase of sites of from 15 to 50 acres for school plants of optimum size. With such sites of adequate size, many localities could provide for combined educational and recreational programs to meet the needs of adults and young people, as well as of children.

Actual or prospective declines in school enrollment call for reexamination of teacher-training facilities. With decline in teacher demand imminent in most States, development plans for State teachers' colleges should be reviewed, and careful consideration given to

the teacher supply being trained in private institutions and in neighboring States. Such studies and plans have been undertaken by the Virginia State Planning Board.

Vocational Training

In Pennsylvania, over 85 percent of all students are receiving an educational emphasis pointing toward commercial occupations, while only 24 percent of the present jobs in the State are in commerce and trade. Adequate educational counseling, vocational guidance, and extensive curriculum changes are needed to fit youth for available jobs. In addition to more flexible curricula to meet a wide range of abilities and occupational opportunities, there is urgent need for more adequate training in all-around social competency to enable youth to meet in a democratic way the crucial political and economic problems of this era of rapid change. In Pennsylvania, for example, on a State-wide front, an effort is being made to gear vocational planning and direction to the actual needs of the community as in the Williamsport plan in Lycoming County.

Education in the South

Virginia and North Carolina, in common with other Southern States, do not provide funds for adequate educational programs, although both have made rapid advances in recent years in their educational system. Not only is per capital general income much lower than in the States north of the Potomac, but, in addition, high birth rates, coupled with heavy emigration of young people and adults, results in a considerably higher ratio of children needing education to working adults able to pay for it, than farther north. With little foreign immigration expected, and with birth rates in many eastern cities lower than those required to maintain present population, it is anticipated that future increments of population in eastern cities will depend, in large measure, on migration from southern rural areas. Consequently, the States north of the Potomac would do well to encourage any plan for better education of their future citizens now residing south of the Potomac.

Rural Library Facilities

The Need.—Of the States in region II, only New York, New Jersey, Delaware, and Maryland have anything like adequate library services, with public facilities being available in each case to at least 70 percent of the population. In the case of North Carolina and Virginia, such service is available to less than 50 percent of the people. Per capita circulation of books in the latter States is less than half that of New York, and less than one-third that of New Jersey.⁵

⁵ Report of Advisory Committee on Education, 1934.

With no attempt to minimize the need for generally improved library facilities, the urgent need, from a social and educational standpoint in this region, is in the rural districts, particularly in the States of Virginia, North Carolina, and Pennsylvania, with serious inadequacies in rural school libraries.

The following figures illustrate the need in each State of the region:

State	Percent population without library service
Virginia.....	67
North Carolina.....	55
Pennsylvania.....	45
Maryland.....	20
New York.....	13
New Jersey.....	5

Recommendations.—Recognizing the library problem as part of the over-all problem of school and adult education, it is recommended that library service, particularly in rural areas, be made available to those not receiving it, as indicated above, either by—

- (a) Adequate school or community libraries; or
- (b) Direct bookwagon or house-door service, following patterns already successful in such communities as Hagerstown, Md., and New Rochelle, N. Y.

Toward Planned Regional Development

The preceding sections have outlined some of the outstanding needs and recommendations for regional development in the Middle Atlantic States. At the present stage of planning in this region, the program presented above does not attempt to touch all phases of regional development, nor to indicate the relative importance of the several functional fields. Rather, it represents a bird's-eye view of the results of planning progress up to the present time, with some suggestions for the future.

State Planning Progress

State planning boards have been established in all the States in this region except Delaware. In each State, however, public funds provided for these boards are inadequate. Appropriations for the current year vary from approximately \$54,000 in Pennsylvania to none in North Carolina. Some planning boards have been successful in getting additional funds for special jobs from other governmental agencies and from private sources. To Virginia, through its State planning board, for example, the general education board has made available \$177,000 for a 4-year program of studies on population, industry, and land use, to be conducted by the State planning board, the University of Virginia, and the Virginia Polytechnic Institute. In Virginia, also, the State planning board has had considerable success in establishing itself as an integral part of the

governmental structure, in cooperating with State departments in preparing plans for the development of certain governmental functions, particularly parks, highways, and schools, and in stimulating the application of planning techniques to the daily work of State administrative departments. Maryland is further advanced than other States in the region in its analysis of problems of finance, taxation, and uniform accounting, in developing administrative procedures for public-works programming, and in laying bases for industrial planning. Industrial studies are now receiving major emphasis in New York and Pennsylvania. New Jersey, probably further advanced to a master plan, has given particular consideration to problems of urban expansion, recreation, and land use.

Most State planning boards in the region have made recommendations for reshaping governmental structure to render more efficient service. In Virginia, for instance, the mere rerouting of school busses according to the suggestions of the State planning board resulted in potential savings of nearly a half million dollars annually. The New York State Planning Council has pointed out the economies possible through reorganization and consolidation of local governments in areas of declining population, and in areas where State purchases of forest and submarginal land is increasing. In New Jersey, in addition to its recommended State land-purchase program, the State planning board recommended that inequitable tax assessment of rural lands, causing tax delinquency and undue hardship in certain areas, should be remedied by centralization of the assessing function over wider jurisdictions than single municipalities, perhaps on a county or even a wider basis. Recommendations for improved tax-collection and foreclosure procedures and for efficient management and sale of tax-reverted vacant lots have been advanced by the New York, New Jersey, and Maryland boards.

Local Planning

State planning boards have also been vitally concerned in the stimulation of regional and local planning. In the field of regional water planning, outstanding work is being done by the Interstate Commerce Commission on the Delaware River Basin. Planning for interstate metropolitan regions is being carried on as a permanent function in the New York area by the regional plan association, and in the Washington area by the National Capital Park and Planning Commission and the Maryland-National Capital Park and Planning Commission. A few counties and municipalities in the region have adequately staffed and efficiently functioning local planning boards, such as in New York City; Washington; Pittsburgh; Norfolk; Monroe County, N. Y.; and Montclair, N. J., to mention a few at random. Few cities, towns, and counties, however, have any truly

adequate planning machinery. Many of those with official planning boards are without adequate funds or direction to carry on broadly conceived planning programs.

The National Interest

Just as stimulation and coordination of local planning should be the function of State planning boards, so the regional office of the National Resources Planning Board seeks to stimulate and coordinate the work of State planning boards in problems of common interest, particularly those overlapping State boundaries. The regional office, in cooperation with the national office, is also charged with the responsibility of guiding Federal planning and public works programming, so as to meet the needs and fit the plans of State and local agencies.

Planning for regional development, however, depends very largely on progress in State and local planning. Without planning by all levels of government properly coordinated, millions of dollars can be spent on ill-

advised and wasteful public and private construction. Although many projects have such obvious merit as to be initiated at once, many others should await further study of their implications in many related fields. These can be thoroughly explored only through the further advancement of planning programs. In many States and localities, stimulation, encouragement, and considerably augmented funds are essential. Since the Federal Government has such a big stake in this work, it should extend increasing aid to State and local planning, if necessary, in the form of Federal grants.

By demonstrating the economies that can be made by advance planning and programming of public works to carry out plans, planning agencies can become indispensable units in advising those engaged in the administration of the public business, whether Federal, State, or local. Only such coordinated planning, geared into the administrative structure at all levels of government, will bring wise and efficient development of this crowded, strategic, and industrial Middle Atlantic region.

PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN

SOUTHEAST: REGION 3, ATLANTA, GA., 1940

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Report of the Southeastern Regional Planning Commission

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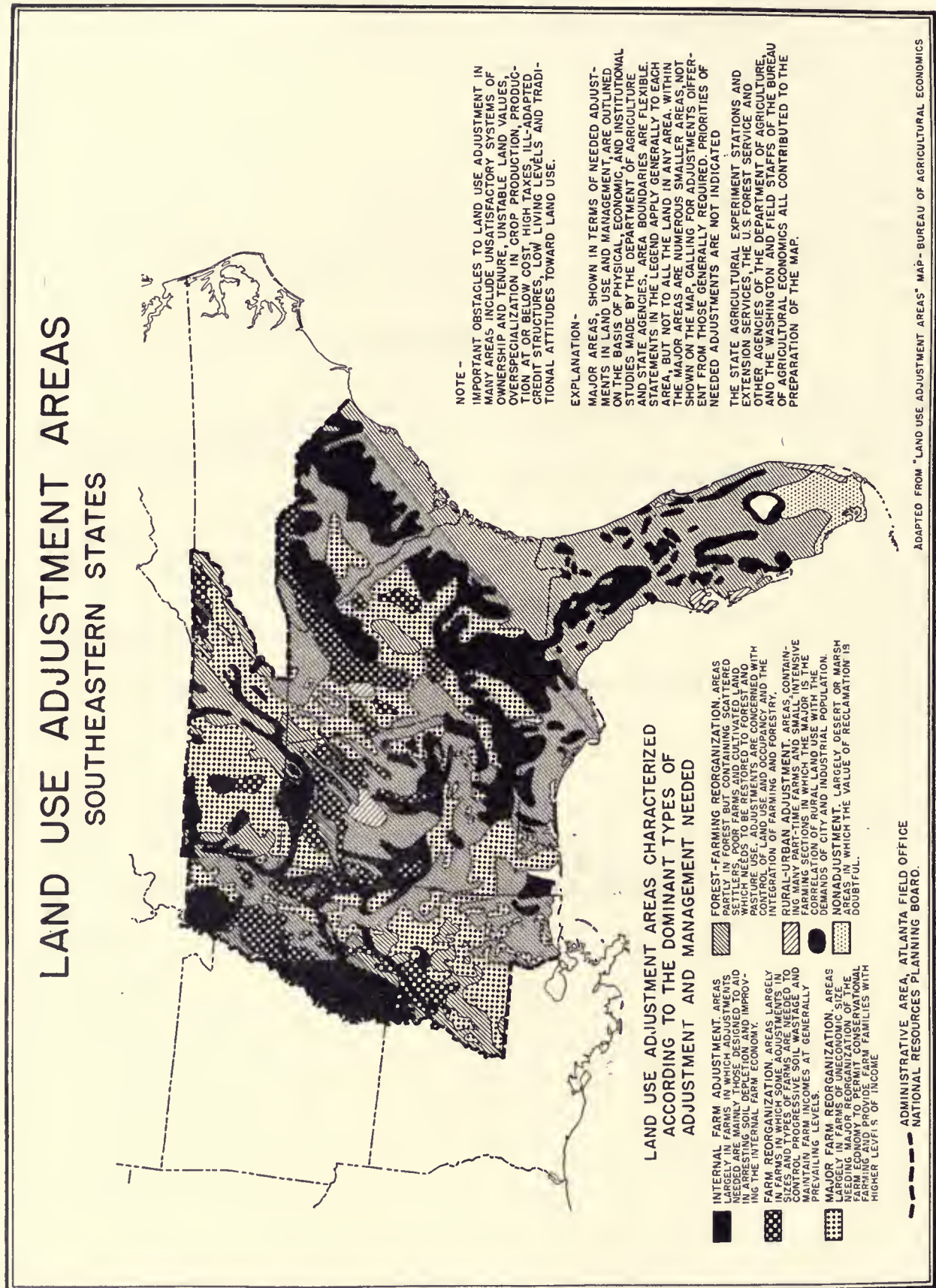


Figure 1.—Land-Use Adjustment Areas

LETTER OF TRANSMITTAL

NATIONAL RESOURCES PLANNING BOARD

FIELD OFFICE

ATLANTA, GA.

October 30, 1940.

Mr. CHARLES W. ELIOT,
Director, National Resources Planning Board,
Washington, D. C.

DEAR MR. ELIOT: I have the pleasure of transmitting herewith a statement developed in the Atlanta field office at your request, entitled "Elements of Action Within a Program of Regional Development." The statement sets forth a picture of the basic resources, central economic problems, and the lines of action which appear to be required at this point for the development of the administrative area within which the office operates—Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee. In its present preliminary form, the statement is intended to provide a point of departure in the preparation of a comprehensive program of regional development. During the coming year, in collaboration with the State planning boards and other State agencies, the newly formed Southeastern Regional Planning Commission and its constituent organizations, and the regional offices of Federal agencies, the Atlanta field office will attempt to secure a refinement of this initial effort looking toward the comprehensive program.

In transmitting the present statement it is necessary that I note the indebtedness of the field office for many of the ideas and much of the material which has gone into the text. While the six-State administrative area over which our office operates does not, in itself, constitute a social or economic region, we have been led to view the area in relation to the literature of regionalism through the writings of Dr. Howard V. Odum and his associates in their work, *Southern Regions*. Since our States comprise 6 of the 11 which are there set up as the southeastern region, the attached statement considers them in relation to the larger whole rather than as isolated political subdivisions. Further, with reference to the over-all ideas incorporated on such points as basic economic problems and development needs, we have leaned heavily upon two articles published by the *Journal of Farm Economics*, in February 1940, as follows: *Cotton, Land, and People: A Statement of the Problem*, by I. W. Duggan, of the Agricultural Adjustment Administration; and *How Can the Southern Population Find Gainful Employment?*, by Rupert B. Vance, of the University of North Carolina. Finally, we have found particularly helpful the September issue of the *Manufacturers Record*, devoted to *The South's Resources*, notably the section on the industrial use of farm products, by Dr. Henry G. Knight, Chief, Bureau of Agriculture, and the section on Georgia industry, by Dr. W. Harry Vaughan, of the Georgia School of Technology.

In those sections of the statement which set forth proposed lines of action within specific functional fields, we are considerably indebted to the State planning boards of our area. In response to our invitation, they provided us with a rich fund of proposals derived from their own studies and special reports of other State agencies submitted for this purpose. With reference to the discussion of needed developments within the field of agriculture, we have been assisted with advice and information from the Atlanta office of the Bureau of Agricultural Economics, United States Department of Agriculture. Again, in the discussion of developments within the field of forestry, we are under obligation to the State forestry agencies, the region VIII office

of the United States Forest Service, and the Southern Forest Experiment Station, the Work Projects Administration, and the six southeastern State planning boards. We have adopted, essentially, the recommendations contained in the report, *The Southern Forests*, which was prepared by the Atlanta field office of the board in collaboration with these agencies under the sponsorship of the Regional Committee on Southern Forest Resources. Finally, among other obligations, must be mentioned that to the Santee-Altamaha, Peninsular-Florida, Tennessee-Cumberland, Pearl-Pascagoula, and Mobile-Suwannee drainage basin committees. In the discussion of needed developments within the field of water resources, we have leaned heavily upon the thinking and information brought forth in several recent meetings of these committees.

The statement in its present form is now circulating among State and Federal agencies and among private organizations and individuals working for the development of the Southeast. Their collaboration in its refinement and further development is being invited. It is our sincere belief and earnest hope that there may come out of this process a thoroughgoing statement of a program for the correction of maladjustments and the sound economic development of our area.

Sincerely yours,

HENRY T. MCINTOSH, *Chairman, Region 3.*

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

THE SOUTHEAST

I. The Southeast

The six States that make up the administrative area of the Atlanta field office of the National Resources Planning Board—Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee—lie at the core of the southeastern region as defined by Odum.¹ This region also includes Arkansas, Kentucky, Louisiana, North Carolina, and Virginia.

These States possess a number of common characteristics in history, soils, climate, people, and in social and economic activity, which tie them together so uniquely that they stand out as one of the major regions of the United States. One of the most important of these common characteristics is the predominance of agriculture over the area and, within agriculture, the predominance of the single cash crop—cotton or tobacco—as a source of income. This characteristic has created something of a regional economy within the national economy—a system of producing, distributing, and consuming food, shelter, clothing, and services that is common among a majority of the people. While many of the difficulties of the region stem from maladjustments in this economy, the system is itself something of a major regional asset, since it provides a handle or key to the solution of problems and the attainment of a sound regional development.

The People

According to preliminary releases of the 1940 census, nearly 15,000,000 people live in the States of Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee. Previous censuses have indicated that the white population accounts for approximately 70 percent and the Negro population for the remainder of the regional total. In none of these six States did the rate of growth between 1930 and 1940 fall below the national figure of 7 percent; in Florida the rate was as high as 27.9 percent. Considering the entire southeastern region, holding about one-fifth of the Nation's people, only Arkansas failed to keep pace with the growth of the Nation as a whole. As in former census periods, the southeastern region has grown faster than the rest of the country. While growth of this magnitude imposes burdens upon these States—in education, in the use of the land, in the migration of middle-age group workers out of the area, for example—it also means

workers to produce wealth and consumers to buy the products of farm and factory.

Basic Resources

The area covered by the States of the southeastern region embraces between one-fifth and one-sixth of the Nation—over one-half million square miles. In the area are rich and varied soil types that provide the basis for great potential diversity in agricultural production. This potentiality becomes even more real when it is noted that the area falls within both the temperate and subtropical zones, that in it is located nearly a third of the Nation's land with a frostless growing season of 6 months and over, and nearly two-thirds of the Nation's area with an annual precipitation of 40 inches or more.

Leaving out Kentucky and Virginia and adding eastern Texas to the southeastern group of States, approximately 3 out of every 5 acres in the southern forest area² is forest land—58 percent of the entire area—169,000,000 out of a total of 294,000,000 acres. All but 3,000,000 acres of this forest area is classified as productive commercial forest. While the proportion and quality of this forest resource vary from State to State, over half of the acreage of each is in forests. Of the 169,000,000 acre area, about 13 percent is covered with old-growth saw timber; second-growth saw timber covers 36 percent; fair restocking timber, 14 percent; and the remaining 16 percent contains very poor restocking timber. The southern forest area produces a rich variety of tree types—the pines, short and long leaf, slash and loblolly, the gums, hickory, oak, ash, and cypress from the swamps. Of the total saw timber, well over half is in pines, about 4 percent in cypress, and the remaining portion in other hardwoods. Perhaps the most vital fact about the southern forest resource is not its present size and variety but the fact that over much of the area, pine growth is rapid enough to make pulpwood out of seedlings in a period of 15 years. Here is an area that must always devote a substantial part of its land to farming—yet well over half of this land is still in forests, a resource far from exhausted. Moreover, it comes to this juncture at a time when the economics of forest industry and the science of sus-

¹ Howard V. Odum, *Southern Regions of the United States*, University of North Carolina Press, Chapel Hill, 1939.

² This is the area covered in a study sponsored in 1938-39 by the Regional Committee on Southern Forest Resources, the results of which have been published in a pamphlet, *The Southern Forests*, by the National Resources Planning Board, Atlanta field office.

tained-yield management make possible the continued growth and increased industrial use of its forests.

The southeastern region is rich in minerals. Of the world's soft-coal reserve, 5 percent is to be found here, approximately one-tenth of the national soft-coal reserve. The region supplies the Nation annually with a fifth of its soft-coal supply—yet 98 percent of the coal seams of the area remain untapped. In 1930 the region provided the Nation with 10 percent of its iron-ore supply and nearly a tenth of its pig-iron production. Available also are other minerals and materials, limestone, granite, fuller's earth, basalt, slate, marble, copper, cement, bauxite, manganese, clay, petroleum, natural gas, soapstone, barite, sand, gravel—these provide a source of raw materials and building materials adequate, in the opinion of mineral experts, to furnish almost all the major needs for chemical and other processing industries.

In addition to coal, oil, and gas, the southeastern region's water resources provide another major source of energy for its industrial development. There is in the region a potential water-power supply of over 5,000,000 horsepower available for use 90 percent of the time—approximately one-eighth of the Nation's total; over 7,000,000 horsepower is available for use 50 percent of the time. In 1939 the region's capacity of installed water wheels in plants, having 100 horsepower or more, amounted to 4,199 thousands of horsepower—approximately one-fourth of the Nation's total.³ The rivers in which this water power is stored dissect the region with navigable streams, providing trade routes from its heart to the Atlantic and Gulf coasts and into regions to the west and north. Coastal cities, large and small, are provided with port facilities, capable of serving ocean-going vessels.

To this brief inventory of population, of land area and soils, of climate, forests, minerals, and water, other regional assets might be added—commercial trapping and fishing grounds, railroads, highways, and air lines. It is evident that the future development will not be retarded by the absence of rich human and natural resources.

II. An Agrarian Country

Up to the present, the rich and varied resources of the region have been devoted largely to agricultural production. Of the region's gainfully employed workers, 43 percent earn their livings in agriculture, as against only 21 percent for the Nation as a whole; 60 percent of the Nation's cotton crop and 85 percent of its tobacco crop are raised by a farm group divided about equally between owners and tenants.⁴ How-

ever, farm acreages in the region, steadily declining, are lower than in the Nation as a whole and, although it contains approximately 40 percent of the Nation's farms, the proportion of the Nation's wheat, corn, beef cattle, milk, butter, eggs, hay, many vegetables and fruits that the region produces in few cases rises over 20 percent, in contrast to the figures for cotton and tobacco.⁵

The predominance of agriculture is further sharpened when contrasted with industrial development. In 1937 the value of manufactured products in the southeastern region amounted to only one-tenth of that for the Nation as a whole; 1,216,412 southeastern wage earners, about one-eighth of the Nation's total, were involved in its production. Of the Nation's 166,794 manufacturing establishments reporting, only 20,560 were located in the region. Despite a leadership in cotton textiles, forest products, tobacco processing, and a distinct prominence in iron and steel, it is obvious that considered in relation to the Nation as a whole, the southeastern region remains a land of farms.

The 6 States within the administrative area of the Atlanta field office share a full part in this agricultural economy since, with the exception of Florida, they number among the 10 principal cotton-producing States. Among these 10 States, the annual average cash income from cotton alone exceeds the combined income from all other crop and livestock sales. The gross per capita farm income between 1930 and 1935 averaged \$127, and the cash per capita farm income \$95.

It is this problem with which citizens of the region are grappling through the several movements that they have organized. In the words of the Citizens' Fact Finding Movement of Georgia—

It is a challenging fact that nearly every report in the Georgia Inventory Series, of the Citizens' Fact Finding Movement, points to the low incomes of our people as a factor seriously limiting the welfare and development of the State. When we consider that the Inventory Series dealt with all major phases of life and work in Georgia, the widespread significance of our limited incomes is apparent. Unquestionably, these incomes must be raised before the solution of many of our problems can be carried forward.⁶

In the single-crop system resides one major cause of low income. Since in both cotton and tobacco the region produces export surpluses, its prosperity rests in large measure upon world-market conditions. Trade restrictions and growing foreign production of these products have long since depressed the export market, a condition that may now be indefinitely aggravated by maladjustments rising out of the present war. All of this has meant, and continues to mean, depressed prices and the problem of assimilating surpluses.

³ National Resources Committee, *Energy Resources and National Policy*, January 1939, p. 240.

⁴ Odum, *op. cit.*, pp. 55-63, 96-97.

⁵ *Idem.*

⁶ Georgia Citizens' Fact Finding Movement, *Industry and Commerce*, Atlanta, December 1939.

There are other factors within the cash-crop system that have contributed to low regional income. Emphasis upon the single cash crop has been accompanied by only minor effort at diversification since, traditionally, the crop produced money with which to buy products not produced on the farm. No other crop has produced such high returns per acre and per man-hour of labor. The direct consequence has been to keep down real income, the value of goods produced and sold plus those produced and consumed on the farm. While the cash crop lessened incentive for diversification, the pressure of a large rural population against existing available cropland reduced farms below a size adequate for raising livestock. It has meant also a deficiency of soil building and conserving crops, lowered fertility, lowered yields, increased expenditures for fertilizers, and less net-cash income.

Finally, the cash-crop system and the history of the region conspired to create a system of land tenure under which a major proportion of farm operators rented rather than owned the land they worked. Thus, tenant farmers have shared with owners a farm income hardly adequate for either; they have moved about in the hope of betterment with little incentive to build up soil or maintain buildings and equipment in good repair. Again, soil deteriorates, production costs rise, and income is lowered. It is estimated that 84,600,000 acres within the 10 principal cotton States have been seriously damaged by erosion.

Outside of the cash-crop system are to be found other factors contributing to a low farm income. The depression following 1929 deprived the farmer of a part of his domestic market and further depressed his prices. The outlet of northern industrial employment, to which thousands of younger workers had turned during the 1920's, was closed.

The absence of industrial development within the area has been a major nonagricultural factor in the story of low income. Local financial and commercial facilities serving in the production of export surpluses for a world market failed to produce a surplus of capital available for industrial investment. An artificial barrier to industrialization was imposed by an obsolete system of freight rates that made distribution costs on manufactured goods produced in the region prohibitive. When industrial development did come, it was financed by capital from the North and East; industrial earnings were then exported also.

Consequences

Low individual income has meant inadequate expenditures for housing, food, clothing, education, and health care by families on the farm and in the cities. It has meant, also, an inadequate source of tax revenues for city, county, and State governments and, in turn,

for school buildings, teachers and teacher salaries, and public-health programs. These conditions not only result from, but also contribute to, the central problem of low income.

III. Program of Regional Development

At a time when democratic government is being put to a real test for world survival, the task of making the social and economic adjustments required to effect an increase in the level of regional income has been taken as a challenge. There is not a single regional problem upon which the beginnings of an attack have not been launched by citizens, separately and in cooperation with agencies of the local, State, and Federal Governments.

Forces at Work

The greater body of thought and discussion in the region is characterized by a desire for the wise use of all regional resources in the building of a system of agricultural and industrial diversity. With this basic income-raising adjustment completed, the remedy for other problems becomes a real possibility. A population protected from malaria, tuberculosis, pellagra, and other diseases and housed in comfortable homes—its children plentifully nourished and in school, its workers employed on farms and in factories earning adequate incomes—is expected to flow first from this integrated development. The new system of agriculture would replace tenancy in part with ownership and in part with a combination of farm and industrial employment. The remaining tenants would be assured of a stake in saving and improving the soil. A new educational system would provide for the training of the youth of the region within the region for participation in the future of the region.

The private efforts being made to bring about this future for the region are considerable. The daily newspapers and the shelves of libraries throughout the area bring daily testimony that citizens are actively engaged in myriad individual and organized attempts to further it. The organization and activities of the southern policy committee, the decade of progress committees in each of the States, and the Citizens' Fact Finding Movement in Georgia are a few of the indications of the earnest and practical thought being given specific problems and programs. The Southern Governors' Conference has already made a major contribution in stimulating action that has led to a partial elimination of the artificial barrier to industrial development imposed by the interterritorial freight rate differential. The work of the Herty Foundation Laboratories in Georgia, in developing the use of southern slash pine for newsprint, has set an example which has vigorously stimulated activity in industrial research in the region's

colleges and has led to wide interest in a series of industrial research institutes. The Industrial Development Council in Georgia has inaugurated a program of laboratory and economic research with reference to site locations for new industries which provides a model for more general adoption. Chambers of commerce in the region have come increasingly to base promotional activities on the scientific and economic findings of such industrial research work. In community, county, and State land-use-planning committees, which blanket most of several States, farmers are evolving from plans for the use of their own land plans for their neighborhoods and counties. These and other similar movements enlist the joint participation of hundreds of citizens in cities and on farms with experts from business, industry, finance, education, and from a host of agencies of the State and Federal Governments.

A partial list of the activities of agencies of Government dealing in a special way with key factors in the development of the region will suggest the scope of the efforts that have been initiated through Government. Thus, for example, the agitation over a period of many years for an attack upon the problem of tenancy has, in recent years, led to Federal action. Beginning with the Bankhead-Jones Act, there is now operating in the region a small but significant tenant-purchase program. The Farm Security Administration is administering a rehabilitation loan program among thousands of low-income farm families and developing the homestead and resettlement projects established in the early 1930's. The problems of erosion and soil depletion are being widely attacked by the local soil conservation districts, State agricultural agencies, extension services of the land-grant colleges, and the Soil Conservation Service. Thousands of acres of land throughout the area, formerly devoted exclusively to single cropping, are now farmed in accordance with proper soil conserving standards. Again, through the leadership of the State forestry commissions, the land-grant colleges, and the Forest Service, an extensive program of fire control and reforestation is proceeding, which now offers a reasonable assurance for a sustained pulpwood yield even with a considerable increase in the annual cut of pulpwood for the growing southern paper industry. These programs of State and Federal agricultural agencies are assisting the farmers on the land in putting into effect the plans of the community and county land-use planning committees. Large multiple-purpose dams are being built along the Tennessee River and on the Santee River in South Carolina. Representatives of Federal agencies concerned with health, wildlife, navigation, and water resources are engaged in joint programs with representatives of State and local agencies and private organizations.

The Pattern

Earlier sections of this discussion have indicated, in summary, that the six States within this administrative area, and the southeastern region as a whole, though rich in resources and in population, are struggling, through agriculture and industry, to increase a low per capita income and make possible higher standards of living and the expansion or improvement of public services, particularly in relation to schools and health. The private and public efforts that are now being made toward this general goal already suggest the appropriate pattern around which future activities should be organized. Within that pattern, it is possible to suggest several needed lines of action, and a brief description at this point of the pattern of development will provide a clarifying setting for a discussion of these lines of action.

Adjustments in the use of the soil, which will conserve it, improve it, and at the same time raise the real income of farm families, constitute a major need throughout these States. The general nature of the required adjustments within the field of agriculture and the specific areas in which they must be made are indicated on figure 1, "Land-Use Adjustment Areas—Southeastern States." Until recently, agricultural practices have led to erosion and depletion over wide areas. Upon some of these lands farming cannot be economically conducted—submarginal lands must be retired. The beginnings that have been made in soil conservation and soil management practices must be intensified if present soil wastage is to be checked and a major resource preserved. Some of these practices require emphasis upon crop methods that necessitate larger farm units per family and a shift in emphasis from the cash crop to forage crops and pasture land for livestock. While a wider variety of farm products is thus provided for home consumption and the real income of farm families increased, larger farm units for the existing rural population create an urgent need for the employment of a portion of the present farm population outside of farming; diversified crop practices require stimulation from an expanded market for the sale of raw materials, livestock, vegetables, fruits, and eggs. The attainment of a higher level of farm income cannot, then, be reached entirely within the field of agriculture.

Consequently, the creation of new employment and market opportunities in nonagricultural industries and services is a key factor in the development of the region and an integral part of a program for the rehabilitation of its agricultural economy. The vigorous industrial utilization of the States' raw materials and resources—minerals, farm products, forests, and water power—is one of the region's primary needs.

A program of adjustments within the field of agri-

culture and of expansion within the field of industry, providing higher per capita incomes, will ultimately assure a more adequate source of revenues for city, county, and State governments and make possible expansion of their facilities and service. While certain of these facilities and services—schools, health programs, and roads, for example, are essential to facilitate this agricultural and industrial development, their ultimate expansion must wait largely upon the attainment of a higher level of regional income.

Within each section of this three-fold pattern, there is much activity in progress, but also, within each there is much work still to be done by citizens in all walks of life, by private organizations, and by agencies of the local, State, and Federal Governments. It remains now to describe several lines of action needed in specific functional fields within that pattern, through which the end toward which it is designed may be brought closer.

IV. Agriculture

There is widespread knowledge of and agreement upon the general nature of the adjustments required within the field of agriculture—on the farm itself—to provide for a permanent increase in the level of agricultural income. For the maintenance of soil fertility and for the reduction of erosion on lands subject to erosion, the following familiar practices may be adopted: Rolling lands can be planted in permanent pastures and perennial hays; cropland can be terraced, and plowing can be done along contour lines; sheet erosion can be checked through the planting of crops in strips; rotation practices can be adopted that will provide soil with winter and summer cover; the production of close-growing crops can be increased and the production of intertilled crops decreased; the turning under of cover crops increasing the absorption of water will serve to lessen run-off; drainage outlets can be built into the soil to carry off heavy rainfall; gulley erosion can be checked mechanically and with vegetative plantings; certain of these practices making for soil fertility—crop rotation and the planting and plowing under of cover crops—must be supplemented through the use of lime and artificial fertilizers. Involved in many of these soil conserving and improving practices is the necessity for using the soil for grazing and feeding a larger number of livestock and for producing a larger share of the family needs for food. In order to provide incentive to undertake and continue such farm-management practices, pride of ownership, and security of tenure must be extended to all farm families, a majority of whom are now without it. Finally, areas of farm land now so seriously damaged by erosion that they cannot be farmed economically must be retired from cultivation and reforested.

In all phases of farm management and particularly in the field of land-use practices designed to conserve and improve the soil, there is available an entirely adequate fund of knowledge and advice accumulated over the years and constantly being enriched through the activities of the land-grant colleges and the agricultural agencies of the Federal Government. Further, as has been previously indicated, there is hardly a current problem vexing the farm population for which there is not a corresponding program of governmental action in operation. However, this advice and these programs result in action only when they are put into effect on thousands of farms by individual farm operators.

In each of the 6 Southeastern States, in 148 counties, and in several hundred rural communities, farmers, collaborating with county agents, home-demonstration workers, and extension representatives of the land-grant colleges, have organized land-use planning committees. These committees, now in the second year of their existence, are administered by the farmers themselves. Several thousand are at work in community committees classifying the land they know and then farming it according to the wisest uses to which it should be put; they are also developing plans for almost all other aspects of farm management and farm life. In their committees and on their farms, they have access to the technical facilities and advice of county agents, representatives of the State agricultural extension services, and field workers administering the agricultural programs of the Federal Government.

Their activities are organized around a guiding outline, "Work Outline No. 1," which was derived out of the experience of farmers, the Program Planning Division of the Agricultural Adjustment Administration and the State agricultural extension services of the land-grant colleges. The program stems from the Mount Weather agreement between the land-grant colleges and the Department of Agriculture, arrived at in the summer of 1938 and providing for a revitalized approach to land-use planning.

The joint participation of individual farm operators and agricultural technicians in community and county land-use planning committees provides a meeting ground for technical advice and governmental programs, on the one hand, and a practical knowledge of local farm conditions, on the other. In this process, the administration of Federal agricultural programs is being adapted to individual farm needs within the framework of existing legislation. Present hopes for the formulation of a wise and workable land-use plan for the six Southeastern States are dependent upon it. The encouragement of this process becomes a major item in a program for the development of agriculture among the six Southeastern States. The following lines of activity appear appropriate.

County Land-Use Planning

An increase in the number of counties in which county land-use planning committees have been organized from the present 198, out of a total of 516 counties within the 6 Southeastern States, to cover at least all predominately agricultural counties in the area should be fostered. The scope of the need within each State can be indicated as follows: County committees have been organized in 56 out of 67 Alabama counties, in 11 out of 67 Florida counties, in 30 out of 159 Georgia counties, in 10 out of 46 South Carolina counties, in 9 out of 95 Tennessee counties, and in 32 out of 82 Mississippi counties. Counties now engaged in the program and the status of their work are depicted in figure 2, "Status of County Land-Use Planning Program." Present efforts to increase the proportion of farmers participating in the work of the committee should be facilitated in all possible ways. In order to enlist all possible cooperation in putting land-use and other farm-life recommendations of the committee into effect, a constant and broad dissemination of information concerning their activities should be made to the general public and to agencies of the local, State, and Federal Governments.

Since the organization and conduct of community and county land-use planning work require the advice and guidance of county agents, home demonstration agents, and representatives of State agricultural agencies and extension services, the allocation of county, State, and Federal funds for adequate personnel should be given a high priority in the budgets at these levels of government.

Since many of the means for translating into action the recommendations of community and county land-use planning committees are found within the agricultural programs of the Federal Government that relate directly to land use, these programs require continued support and increasing adaptability to the needs determined in the land-use planning work of the local committees.

The process of planning for the proper use of the land by farmers and technicians on individual farmsteads can be supplemented with lines of action in several other directions, of which the following are some of the more important.

Opportunities for Settlement

Extensive use of farm land in pastures and cover crops makes it imperative that the total area of land available for farming in these six Southeastern States be extended. There is reason to believe that the improvement and extension of drainage facilities in rural areas affected by the backwaters of the Mississippi River may provide the basis for extensive land settlement. A thoroughgoing study of conditions within its official drainage districts authorized by the Mississippi Legis-

lature in 1938 is now nearing completion. A joint Mississippi Backwater Area Study by the Department of Agriculture, the Fish and Wildlife Service, the Department of the Interior, and the United States Corps of Engineers is attempting to classify a vast area of flood-damaged land on the basis of its use capabilities, in order to provide a basis for directing its settlement and to determine the amount of backwater development justified in light of land-use possibilities and the cost of development and management. Translation of the recommendations of these studies into State and Federal action is a major consideration in a program for the agricultural development of all of the Southeastern States.

Written Tenant Leases

The problem of tenancy can be considerably minimized by the widespread adoption of written tenant leases assuring landowners of good farm-management practices and tenants of a formally recognized return on time and money spent in improvement of soil, buildings, and equipment. The adoption of such formal leases can be materially aided by the sympathetic support of those who depend indirectly upon farming for a livelihood—business and professional groups, bankers, and publicists.

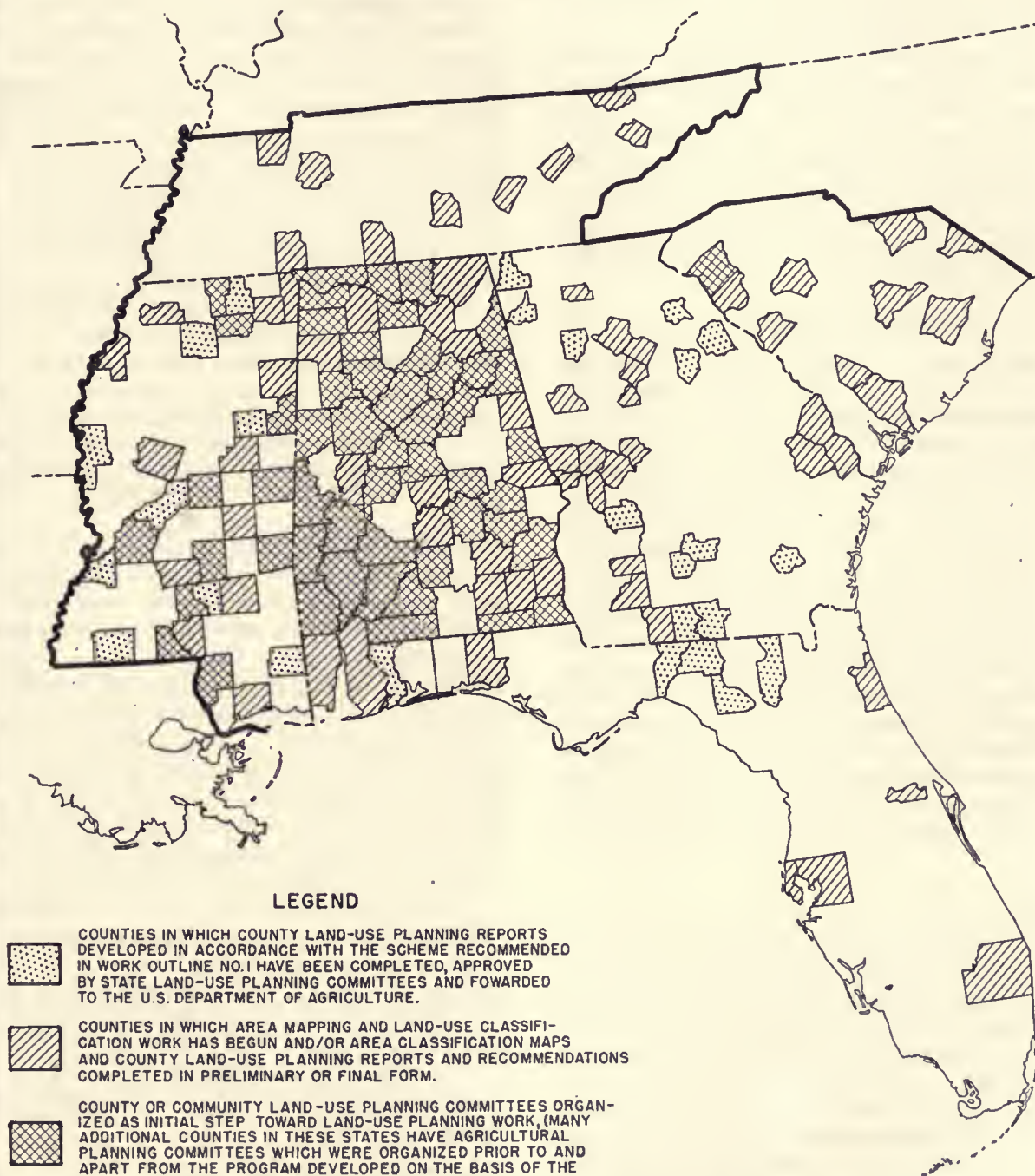
Tenant Purchase

The scarcity of long term credit at low-interest rates for farm mortgages and the necessity of putting private capital to the service of creating employment and market opportunities outside of agriculture require a continuance of the allocation of Federal funds for investment in financing farm purchase among tenants.

County Zoning

With the advent of county plans laying out a pattern of desirable uses for rural lands, the counties of the six Southeastern States will be in a position to inaugurate programs of rural zoning such as have been undertaken by counties in Wisconsin, Michigan, Pennsylvania, Virginia, California, Indiana, and Washington. Such programs, incorporating into county ordinances the land-use patterns devised by farmers and county agents and State extension workers, would permit the continuance of existing land uses but confine future uses for farms, forest, and recreation purposes to specified areas. Land deemed submarginal for farming would be closed to future settlement, impoverishment, and tax delinquency resulting from unsuccessful attempts at farming them forestalled, and the cost of maintaining county schools and roads in such areas saved. An experimental study of Hamilton County, Tenn., made jointly by county officials, and State and Federal agricultural technicians, has provided the basis for a rural zoning

STATUS OF COUNTY LAND USE PLANNING PROGRAM SOUTHEASTERN STATES



SOURCE: PREPARED FROM INFORMATION AS OF JUNE 30, 1940, SUPPLIED BY THE BUREAU OF AGRICULTURAL ECONOMICS, U.S. DEPT. OF AGRICULTURE

PREPARED IN OFFICE OF THE NATIONAL RESOURCES PLANNING BOARD

FIGURE 2.—Status of County Land-Use Planning Programs

program in that county; and the legislatures of Florida, Georgia, and Tennessee have passed acts enabling a few counties to proceed with rural zoning.

Rural Electrification

Further extension of private and public facilities for rural electrification within areas outside of Tennessee, northern Alabama, Georgia, and Mississippi, now being served increasingly with electricity from the dams of the Tennessee Valley Authority, is a necessary adjunct to a program of sound land use. Aside from normal household uses, such facilities can be put to a number of income-producing uses—in the fast freezing of fruits and vegetables and in household and community refrigeration of farm produce for home use and for market, for example—which would foster and support diversified crop practices.

Cooperative Production and Marketing

As a contributor to higher real farm income, the cooperative production and marketing of farm products should be considerably expanded. At present, the field of cooperatives is characterized by a few scattered but highly successful undertakings, such as the cooperative marketing of handicrafts by the Southern Highlanders, and the cooperative production of potatoes for starch by some 1,200 farmers near Laurel, Miss., which is netting them income in excess of that from cotton sales.

Other lines of action, treated below, are required to make possible the changes that lie ahead in crop and livestock, soil conserving and improving practices. Such practices will be possible provided there is a regional market for a diversity of farm products and a field of nonagricultural employment opportunities for a large portion of the present rural population of these States. Since industrial expansion is the initial stimulus for the creation of both, its discussion at this point is appropriate.

Industry

The six Southeastern States and the larger southeastern region, however much tied together in an agricultural economy, are similarly tied into the economy of the Nation as a whole. It is hardly possible for these States to experience an industrial expansion without the stimulus of similar expansion elsewhere. This relationship takes on particular significance in light of the current impetus to industrial activity resulting from expenditures for defense preparations and the cutting off of imports from European nations. These States have been strikingly reminded of this interdependence in terms of enormous orders for textile products, of a new aircraft industry at Nashville, Tenn., and of the effects of the stoppage of Scandinavian pulp imports upon the pulp-paper industry along the Atlantic and Gulf coasts for example.

But whatever the emergency or long-range factors conditioning general expansion, the area must, in its day-to-day work, continue to seek new employment-creating and income-producing uses for its labor, power, and raw materials. It is noted that on the basis of almost exclusive cost advantages, a certain degree of industrialization has already developed—textiles on the Piedmont, iron at Birmingham, aluminum in Tennessee—and may be expected to develop further. The South has been witness to a dramatic example of the fruits of research looking toward the industrial use of its raw materials and farm products in the growth of the new pulp-paper industry based upon the experiments of Dr. Herty and others with slash pine. Earnest questions are raised concerning the possibilities of building up additional industries that will find economic justification for location within the region.

The answers are encouraging. Referring to scientific studies of the opportunities for industrial diversity in the Southeast, Odum notes that—

* * * perhaps the Southeast could well develop either new or increased plant capacity in a hundred or more industries, in addition to certain major fields * * * such as paper pulp from loblolly pine, fertilizer from special processes, and various chemical industries which utilize raw materials of forest and field.⁷

Industrial chemists have pointed to a number of demonstrated uses for the cellulose from straw, stalks, hulls, and other wastage in crops now grown in the Southeast. After partial refinement, this wastage can be developed into paper, absorbents, insulating material, building board, and after purification, into compounds that are useful in producing celluloid and other plastics, explosives, and rayon. Lactic acid derived from corn, sugar, and milk is being utilized in the preparation of artificial resins belonging to a class of plastic that is a constituent of such varnishes, paints, and lacquers as are being used in the automobile industry. Competent economic and technical research has pointed to operating advantages within the area for ceramics, paper finishing, and food-processing industries, among others. A much wider field for the industrial utilization of manganese, bauxite, and other minerals is indicated. Technicians engaged in making such findings see even greater possibilities ahead with further work.

To facilitate the establishment of industries to develop these industrial opportunities, several desirable lines of action can be listed.

Industrial Research

The development of industrial activity upon the basis of laboratory findings and the promise of richer future findings makes imperative the extension and

⁷ Op. cit. See also articles by Dr. Henry G. Knight, *Industrial Utilization of Southern Farm Crops*, and Dr. W. Harry Vaughan, *Profits in Georgia Industry* in *Manufacturers Record*, September 1940.

continued support of existing private and public facilities such as those maintained by the Herty Foundation, the Industrial Development Council in Georgia, the land-grant colleges, and the new Regional Research Laboratory of the Department of Agriculture at New Orleans, established by Congress in 1938. In addition to chemical and mechanical investigations, further economic research is required in analyzing specific industrial processes with reference to possible locational criteria, inasmuch as those new industries are to be preferred which—

(a) Possess an advantage in production costs at their chosen sites as against other possible locations, thus assuring permanence and eliminating dependence upon regional wage differentials;

(b) Produce for a diversified regional and national market;

(c) Are small and capable of operating at a distance from areas of industrial concentration;

(d) Carry materials through several stages of production and possess high ratios of value added by manufacture to total value of the product, thus assuring that the maximum of wage payment will be left in the region;

(e) Will harmonize with or supplement existing industrial and employment patterns within the community.

Industrial Promotion

The closest possible liaison should be maintained between State and local development commissions and chambers of commerce, on the one hand, and private and public agencies doing industrial research on the other. In order that industrial promotion activities may be based upon the best available technological and economic knowledge, proof of positive economic advantage should replace costly artificial subsidies in attracting industries into the community.

Freight Rate Adjustments

Recent adjustments in interterritorial freight rates on several commodities have served partially to remove an artificial barrier to the expansion of manufacturing in Southeastern States. With the reduction in the cost of railroad operation in the area and with the increase in traffic that increased industrial activity brings, reductions in the rates for shipment of an increased number of manufactured products are possible and should be forthcoming.

Investment Capital

It is important that new industries be financed, insofar as possible, with local capital in order that capital wealth created through industrial production may be

left in the area as the basis for further expansion and the maintenance of a higher standard of living. There is reason to believe that a large share of the financing of smaller industries can be so provided, the proportion of stock and bond sales to investors outside of the area considerably reduced, and a maximum share of the interest and dividend payments of new industries left in the region. Present industrial loan policies of the Reconstruction Finance Corporation are a necessary supplement to local financial resources.

Defense Industries

The necessity of building additional plant capacity for the production of defense materials provides an opportunity to increase the industrial capacity of the Southeastern States without injury to industrial areas elsewhere. Southeastern government and business leaders are exerting strenuous efforts in working with prospective industrialists toward this end. The deliberate direction of a portion of new plants and orders for defense materials into the area, when compatible with the necessity for speed and efficiency in defense preparations and with considerations of military strategy, should be given serious consideration within the Federal Government.

Community Planning

The influx of new workers and the construction of new plant facilities within the community will necessitate adjustments in all municipal facilities and services—schools, streets, water supply, and sewage disposal. The obvious need is for community planning that will anticipate and provide in advance for these adjustments so that housing shortages, overcrowding of schools, sanitation problems, and disruptions of municipal finances may be forestalled.

VI. Forestry

Provided the forests of the Southeastern States are scientifically managed, their use can be further extended in the expansion of both the agricultural and industrial development of the area. Forests are one immediate and practical type of use to which submarginal farm land can profitably be devoted, and soil, water, and flood control advanced. The sale of raw forest products even now provides a major source of income to farm families. New forest industrial development has provided work for those unemployed, or only partially employed in agriculture. Its expansion may prove to be one important way of providing nonagricultural employment for those who leave the farm as more extensive land uses and mechanized farming develop.

Considerable difficulties confront private and public efforts to conserve and develop this regional asset, but they are not insurmountable.

According to the report of the Regional Committee on Southern Forest Resources, "were it not for the loss due to fire, insects, disease, wind, and the choking off of young trees through failure to thin them out properly, the annual growth of southern timber would substantially exceed the drain upon it."⁸ In 1936, the total growth was slightly in excess of the total drain, and 27 percent of this drain resulted from natural forces and destructive agencies, a loss which might in large measure have been prevented by more adequate fire protection and better forest management.

Fire Protection

One of the basic requirements for the protection and expansion of southern forests is the provision of adequate facilities for the control of fire—ranger stations, fire towers, telephone lines, truck trails, and artificial firebreaks. Private forest owners are sharing the costs of extending and maintaining protection together with their State governments and the Federal Government. A sum of \$2,500,000 is annually authorized under the Clarke-McNary law for the Federal contribution to this work, but funds actually provided under the law have not reached this figure in recent years. The South has received approximately a quarter of the total. Only about half of the southern forest area is currently receiving organized protection. It is estimated that a \$9,000,000 yearly contribution would be required from the Federal Government for the full protection of all lands. It has been demonstrated that Federal contributions matched with State and private funds will bring a return of 30 cents an acre for each 4 cents invested.

Forest Management Education

An adequate educational program teaching the possibilities and methods of modern forest management is a second basic requirement. It is estimated that the annual yield of southern forest might be doubled or tripled if such methods were followed in planting, cultivation, selective logging, and in insect and disease control, especially by small woods owners and farm forest operators. Again, under the Clarke-McNary law, the Department of Agriculture is authorized to spend \$100,000 yearly, if matched by State funds, in furthering farm forest production, although appropriations for this purpose have averaged only about \$50,000 annually, with approximately \$13,000 going to Southern States. By 1937, more than 10,000 farmers were practicing selective logging, and over 120,000, or 10 percent, were engaged in organized fire protection, due to the work of trained foresters, vocational education teachers, and the general dissemination of advice on forest management. In 1937, the Norris-Doxey law

authorized \$2,500,000 of Federal funds to be expended in cooperation with State forestry agencies, land-grant colleges, and universities in providing advice and assistance in farm forestry, and an initial appropriation for 1940 was made for this purpose. The required State-Federal farm forestry educational program depends in large part upon full and continued appropriations under these two laws.

Reforestation

So great is the area of reforestable land in the region and so favorable is the climate that, in the main natural reseeding under adequate fire control and forest management must be depended upon for reforestation. The planting of seedlings, however, makes possible the controlled reforestation of submarginal lands in the interests of soil conservation and watershed protection. It is estimated that the 173,000,000 nursery seedlings furnished by State, Federal, and private nurseries in 1938 do not constitute an adequate planting program. To meet the increasing demand for seedlings, it is necessary that the nursery and planting programs of State and Federal agencies be extended and operated in close conjunction with each other, especially in securing a balanced distribution of seedlings over reforestable lands.

Public Forest Program

An extension of the State and National forest program is required as a means of building up a public forest reserve, conserving scenic and recreational values, demonstrating scientific forest management, promoting flood control, and reforesting submarginal lands. In order that these reserves be widely distributed, there is need for expansion in the number of State forests in each of the Southern States, as well as in the number of county and community forests. The Fulmer Act provides Federal aid for the purchase of State forest areas, although no appropriation has yet been made. The States will be in a position to benefit from the terms of the act by making the review and public reservation of tax-forfeited land required after 1942 under this law. The purpose behind a public forest program can be furthered also by congressional approval of the temporary leasing of private land for public operation; such approval would make possible the use of Work Projects Administration labor on private forest land needing planting, thinning, and general improvement.

Outdoor Recreation

Recent water conservation developments and submarginal land policies of State and Federal governmental agencies have provided opportunities for the use of potential forest lands as nonurban outdoor

⁸ Op. cit., p. 4.

recreational areas. Inventories and plans providing for park and wildlife areas have been made under the park-, parkway-, and recreational-area studies by each of the six Southeastern States, collaborating with the National Park Service. The implementation of these plans through public-land acquisition, tax reversion, and gifts will serve the triple purpose of better land use, a public forest program, and recreation.

Forest Credit

Since the necessity of paying recurrent annual interest and tax obligations is a factor making for wasteful cutting practices on private forest lands, serious consideration should be given to a Federal guarantee of forest mortgages and to the possibilities of direct, low-interest-bearing Federal loans. With adequate credit at reasonable rates, the private owner would be enabled to refrain from cutting during the relatively profitless years of waiting for a mature stand of timber. Once the stand had matured, he would be able to begin a program of yearly cuttings and sales that balanced with the yearly growth.

Uniform State Legislation

Finally, the wide variation in State laws relating to forestry—to taxation, timber theft, arson, burning permits, and delinquent tax procedures, among others—and in their enforcement suggests the need for an interstate conference to formulate a uniform system of such State laws for the region.

VII. Water Resources and Transportation

The water resources of the six Southeastern States, as previously noted, constitute one of the major assets of the area. Nevertheless, the combination of heavy precipitation, long seasons of high temperatures, and wide expanses of lowlands near sea level creates problems in health. Some of the uses to which ground water and streams are put in industrial development and urban growth create added problems—for example, depletion of city water supplies and pollution. Before the States can take full advantage of the power and navigation resources provided in their rivers and coast lines, it will be necessary to have devised effective means of dealing with water problems. An enumeration of some illustrative cases will serve to point up this need.

Problems of Water Use and Control

One forceful example of the need for conservation of ground-water supplies for industrial and municipal uses is provided by the serious ground-water shortage experienced by the population of the Miami and Tampa areas in Florida. The drainage of the Everglades for agricultural uses may have contributed substantially

to this depletion. Heavy industrial uses and wastage of water have seriously impaired ground-water supplies in large Alabama cities. Again, largely as a consequence of poor drainage in coastal lowlands, deaths from malaria from 1930 to 1935 averaged 372 per 100,000 of population. Water pollution and contamination from the dumping of industrial wastes into rivers along the Piedmont section of South Carolina seriously jeopardize fish and wildlife.

While ground-water shortages may be forestalled by the capping of artesian wells and other conserving practices and malaria control effected through construction of proper drainage facilities, and while adequately enforced legislation can correct for pollution and contamination, these water-control problems affect many phases of life among these States, and there are grave deficiencies in hydrologic and other data concerning them. To remedy these deficiencies requires continuous cooperative study by private organizations and agencies of the State and Federal Governments concerned with public health, flood control, fish and wildlife, and land use, in order that their programs may be brought into common attack upon these problems.

The Southeastern States have been the scene of action for the inauguration of a national policy looking toward the multiple-purpose development of water resources. The Congressional Act establishing the Tennessee Valley Authority expressly directed that the Tennessee River be developed for flood control through a series of dams so constructed that they would serve for the generation of electrical power as well as for navigation. The United States Corps of Engineers, charged with the responsibility of developments on the Nation's river systems, has undertaken studies looking toward the multiple-purpose development of other rivers within the Southeastern States and is engaged in further investigations with agencies of the Federal Government concerned with agriculture, health, wildlife, recreation, and water control. The construction of such multiple-purpose projects simultaneously with the execution of the joint plans of State and Federal agencies in these corollary fields may make an important contribution to the economic development of the Southeastern States.

Power

While Florida and Mississippi have relatively small amounts of potential and undeveloped electric power, the possibilities in Georgia, South Carolina, and Alabama are abundant. In 1937, Georgia's hydroelectric output was slightly more than 1.4 billion kilowatt hours, while it is estimated that almost twice that amount could be produced from undeveloped sources. Preliminary plans for the Clarke-Hill project on the

Savannah River provide for power facilities. In South Carolina, where the Santee-Cooper project is being constructed at the confluence of the Santee and Cooper rivers, 1937 output stood at 1.7 billion kilowatt-hours with an estimated 2.2 billion available in undeveloped power. Alabama, with important power reserves in the Tombigbee and Warrior River systems, had a potential undeveloped output of 4.3 billion kilowatt-hours. Even greater undeveloped output was available in Tennessee for development by the Tennessee Valley Authority. Since electrical energy is easily and cheaply transmitted from the source of generation, this backlog of undeveloped power in four Southeastern States can play an important part in the decentralized development of industries using electrical processes in the conversion of raw materials near the sources of supply.

Navigation

A more industrialized economy in the Southeastern States would make profitable use of the rivers for low-cost movement of freight in bulk, where speed is not important. Multiple-purpose developments on the Tennessee and Santee Rivers, cited above, provide for transportation locks, which will permit access from ocean ports to present inland agricultural and industrial areas. Where future needs are clearly indicated in preliminary joint investigations, the inclusion of navigation locks in multiple-purpose projects under consideration will provide a necessary supplement to facilities for which provision has already been made. To the extent that economic development is found to require improvements in river navigation facilities, the maintenance of adequate port facilities and coastwise canals will be essential.

Other Transportation Facilities

As in the case of navigation facilities susceptible of development on the coast lines and in the rivers of the Southeastern States, each of the other modes of transportation possesses respective advantages to be evaluated in light of the type of transportation services that the future economic development of the area is likely to require.

Railways.—The existing network of railway facilities can probably meet the needs of an even more highly diversified agriculture and industry in the Southeast for long-haul heavy freight and for long-distance, low-cost passenger transportation, without physical extension. However, two imminent changes in the nature of these services may contribute substantially to the attainment of that agricultural and industrial diversity, (1) the expansion of the recently inaugurated express pickup and delivery plan, which coordinates rail and highway services, and (2) the expansion of the high-speed Diesel-electric passenger service now operating

between the Southeastern and the North Central States.

Highways.—When highway transportation facilities are considered in light of the future economic development of the Southeastern States, it is evident that they must provide first for a system of farm-to-market roads permitting the free movement of farm produce (foods and raw materials) to industrial centers. They must provide equally for an interstate movement of finished and partially processed industrial products. The need for early development of a system of intercity express highways does not become as pressing in such an area as it does in areas of greater urbanization, although there are obvious needs for through routes to serve perishable produce movements and tourist travel between the North Central States, Florida and the Gulf coast, and the mountains. While there is at hand no completed proposal for a regional highway system, the State highway agencies of the Southeastern States, cooperating with the Public Roads Administration in the State highway planning surveys, have accumulated nearly all of the essential data on traffic and motor freight movements, existing facilities, and ability of States to finance construction. The next appropriate step is the use of these data to formulate an interstate or regional highway system, which, though neither static nor final, would serve as a guide to future construction. Such a system would conform to the following standards:

1. Continuous through routes corresponding to major streams of through traffic.
2. Consideration of specific requirements of through traffic (bypasses, separated intersections, control of access, and roadside developments).
3. Uniformly high construction standards for such elements as alignment, grade, curvature, road surface, etc.
4. Modern highway legislation and advanced highway planning policies.

Airways.—While the function of air transportation among the Southeastern States might appear likely to remain one of providing rapid communication between major cities in the Southeast and metropolitan centers elsewhere, current national defense programs and the dynamics of the relatively new aircraft industry inject elements of uncertainty into the picture. For example, a survey made by the Civil Aeronautics Authority in 1939 indicated a need for expansion of two-thirds of the existing airports in these States in light of the demands then being made upon them. Appropriations for airports by the present Congress have initiated construction on a program that will probably more than fill these needs. Similarly, present commercial airport facilities are being designated for use in military training, and new military facilities are to be constructed

so as to serve future commercial use. In the meantime, the function of constructing, maintaining, or regulating airport facilities has not been fully provided for within the administrative organization of local and State governments. In order that present rapid defense construction in this field may be smoothly related to existing patterns of transportation and physical lay-out, and in order that the greatly increased facilities that will result from this construction may be properly developed and used, the immediate need is to provide adequately for this function.

VIII. Health and Education

If the six Southeastern States and the larger southeastern region were at the moment as richly endowed with public and private facilities for education and public health as they are in people, climate, forests, minerals, and streams, the making of the adjustments necessary to bring about an economy of agricultural and industrial diversity would be much surer. "Buoyant" health, trained minds and hands would be speedily adaptable to new land uses and factory jobs, but for this, present health and educational facilities within the area need major extension. Local and State revenues are now adequate only for the maintenance of existing schools and public health programs at prevailing qualitative standards. It is on this score, more than any other, that the States are faced with the impossibility of lifting themselves by their bootstraps. Proposals for increased Federal aid to schools and for public health work have been prominently voiced by the Advisory Committee on Education and in the public works-hospitalization plans that have been under discussion both within these States and in the Federal Government.

Perhaps the only significant contribution that these States can make to the improvement and extension of existing school facilities, pending an increase in the level

of regional income, lies in the field of savings through consolidation of facilities and more efficient operation. If present facilities were more nearly adequate, it would be possible to point out, in light of likely changes in employment patterns, certain special requirements to guide the extension of new facilities. For example, a more highly industrialized region will require vocational education facilities away from areas of urban concentration. Such needs could, perhaps, be met by the enlargement of the vocational education program of the National Youth Administration now under way in the area.

The immediate need in the field of public health is for the extension of the county public-health service program to all counties not possessing the service, and an increased personnel in all counties now being served in order that the excessive burden upon the present staff may be relieved. Increased personnel would make possible more extensive coverage and more adequate attention to individual cases. As indicated in the discussion of water resources above, drainage programs along the Coastal Plain offer a singular opportunity to reduce the incidence of a major health problem in the region; the expansion of the present rural housing work of the Federal Government would offer a second.

Finally, it is not unimportant to point out that an economic change as thoroughgoing as that described in earlier sections of this discussion involves far-reaching changes in the way of life of a major segment of the Nation's population. Once before in its colorful economic history, the South has experienced a similar change. The coming of the cotton textile industry southward brought with it many model villages but many more "mill towns." The social cost involved in the physical squalor of those developments has not yet been compensated for in payrolls. It must be the first concern of all to see that the new industrialization is a healthier one.

**PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
LAKE STATES AND OHIO VALLEY: REGION 4, INDIANAPOLIS, IND., 1940**

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Report of the Lake States and Ohio Valley Regional Planning Office

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LETTER OF TRANSMITTAL

NATIONAL RESOURCES PLANNING BOARD

FIELD OFFICE
INDIANAPOLIS, IND.

September 30, 1940.

Mr. CHARLES W. ELIOT 2d,
*Director, National Resources Planning Board,
North Interior Building, Washington, D. C.*

DEAR MR. ELIOT: I have the honor to present herewith a regional development plan for region 4, comprising the States of Illinois, Indiana, Kentucky, Michigan, Ohio, West Virginia, and Wisconsin.

The basic objective of this plan is the utilization of the resources of the region in a manner which will promote their conservation and contribute to the welfare of all of the people who reside and work in the region or depend upon its activities. It is a step toward better understanding of the opportunities of the region and the manner in which they may be grasped and utilized.

In reaching the conclusions set forth in the plan, the staff of the field office had the cordial cooperation of many persons familiar with the complex qualities of the region. Grateful acknowledgment of their advice and assistance is extended to those included in the list of contributors attached to the plan and to many others with whom the regional plan was discussed.

Respectfully submitted.

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SUMMARY

The utilization of the resources of the region in a manner that will promote the conservation of these resources and contribute to the welfare of all of the people who reside and work in the region or depend upon its activities may be promoted by adherence to these definite policies:

1. Development of the use of the natural resources of the region in a manner that will conserve their potential capacity, insofar as conservation is compatible with utility.

2. Restoration of renewable natural resources that have been depleted.

3. Expansion of appropriate industry to provide greater diversified opportunities for employment throughout the region.

4. Provision of ample facilities for research and the equipping and educating of people to take advantage of employment opportunities.

The general policies of development logically divide into functional policies, related to outstanding regional resources. There is general agreement upon the sound doctrine of the following elements of the regional development plan:

Forests

Restoration through public ownership and operation of forests on at least one-half of the hilly and mountainous areas of Indiana, Ohio, Illinois, Kentucky, and West Virginia, and most of the cut-over forest lands of northern Michigan and Wisconsin, to renew the forest resource, provide immediate employment in restoration, and continuous work in the sustained-yield forests of the future.

Preservation of existing merchantable timber areas by operation on a sustained-yield basis.

Use of local areas of hilly or submarginal land for farm forests.

Expedite the acquisition of forest land in Federal forest-purchase units.

The Forest Service should be alert to new agricultural methods on poor land and, where successful, be ready to release public land for private and other agricultural use.

Establishment of forests on the stripped soils of open-pit coal mines, where such procedure has been determined to be the most suitable method of rehabilitation.

Expansion of the research work of the Forest Products Laboratory as a step to establishment of new industries using forest products.

Agriculture

Pasture Lands

Expansion of the research, educational, and extension services of State agricultural colleges and demonstration projects to promote preservation and conservation use of pastures in the hill sections and inferior soil areas of the region.

Purchase by appropriate governmental or other agencies of experimental areas of pasture land in the submarginal farming areas of Kentucky, West Virginia, and southern Illinois, Indiana, and Ohio, to permit establishment of pasture grasses, followed by leasing or reselling as grazing areas, where farmers cannot economically carry on restoration themselves.

Cropland

Expansion of research, educational, and extension programs of the agricultural colleges and experiment stations, particularly within the counties, to bring about better use of cropland and more diversified production of food and industrial crops, and expansion of technical service available to land-use planning committees.

Adjustment of land use in the general farming areas of the southern part of the region, so that approximately half of the land will be in forest, one-fourth in pasture, and one-fourth in crops.

Rearrangement of farms on the land suitable for crops in the northern cut-over regions so that each farm will possess enough cropland to support a family.

Expansion of the experimental Farm Security Administration program of good cropland purchase for individual farmers in the northern cut-over area and in the southern submarginal areas.

Land Classification

Continuation of the land-classification work of the county land-use planning committees, working in cooperation with the agricultural experiment station and the Bureau of Agricultural Economics in all counties of the region.

Enactment of county zoning enabling acts in Kentucky, West Virginia, and Ohio, and strengthening the Indiana act, followed by enactment of county zoning ordinances, based upon the advice of county land-use planning committees.

Adoption of a soil-conservation-district act in Ohio, and establishment of soil-conservation districts where recommended by county land-use planning committees.

Public purchase of forest areas and nonconforming farms in forest districts of zoned counties, where the people cannot be employed in the area.

Enactment of laws establishing sound policies of reversion of tax-delinquent land to the State in Ohio, Illinois, and Kentucky.

Under State or county direction, bring isolated or scattered populations into closer settlement, to avoid costs of maintaining roads and schools.

Recreation

Development of recreational land and facilities in accordance with the principles and recommendations of the State recreation plans of the National Park Service and State agencies.

Establishment of river forests or parkways along the principal streams of the region.

Control of lake levels to insure continued use of northern lakes for recreation.

Acquisition of more areas of beach along the Great Lakes shores near large population centers.

Control of beach erosion.

Expansion of program of building small recreational lakes, and establishment of conservation pools in flood-control reservoirs.

Expansion of research, educational, and extension services of State universities to bring about higher standards of recreational services.

Wildlife

Ratification of treaty regulating commercial fisheries of the Great Lakes by Canada and the States involved at once.

Continuation of wildlife development under direction of the Fish and Wildlife Service of the Department of the Interior and the appropriate State agencies.

Minerals

Expedite systematic topographic and geologic mapping of State and Federal geological surveys as an essential aid to the discovery and development of the mineral resources and to comprehensive studies in land utilization.

Expand researches on high-volatile coal and combustion devices to develop the potential capacity of the coal industry and improve standards of living in coal-mine areas and in cities and communities dependent upon such resources.

Accomplish a readjustment of freight rates to enable river transportation of coal from Illinois, Indiana, and western Kentucky to Minnesota and to ports in Wisconsin and Michigan, in order to aid summer employment of miners.

Low rates exist on the Great Lakes for summer haul from the eastern coal fields to Lake Michigan and Lake

Superior ports that give them an advantage over the Illinois, Indiana, and western Kentucky coal region.

Promote fundamental research on the nature and constitution of coal to increase the use of coal as a chemical raw material. Coals of different ranks require somewhat different researches. The Illinois Geological Survey, for instance, is carrying on researches adapted to the high-volatile coals of the Illinois field.

Institute vocational education for mineral-industries workers under qualified education auspices to aid in the rehabilitation of displaced miners.

Promote geological and chemical research that will furnish fundamental information needed in the discovery and development of oil and gas reservoirs, and in the conservation and efficient utilization of oil and gas.

Encourage the use of clay products in areas where timber resources are depleted. Lumber from as far distant as the State of Washington is being used widely in Illinois, and it is thought that the use of local clay products would be of advantage to Illinois farmers and others because of their permanence and lowering of fire hazards.

Promote fundamental research on the nature and constitution of the clay and shale resources to provide new information for manufacturing improved and new clay products. There have been great advances made in ceramic engineering, but until recent years the raw material itself has not been studied from the standpoint of its mineralogical constitution because the means for such research had not been developed. Opportunities are great for such research.

Promote the use of local stone resources suited to construction. This will also apply to local deposits of sand and gravel, local cement products, etc.

Extend research on local mineral resources for metallurgical and other processing uses.

Encourage chemical research on the use of fluorspar in the chemical manufacture of fluorine compounds, which will find wide use in the chemical industry, with a view to ameliorating the depressed conditions in the Illinois-Kentucky fluorspar area.

Expedite field investigations of local suitable agricultural limestone deposits and mineral fertilizers for soil rehabilitation.

Industry

Development of suitable industry in all parts of the region to stabilize employment for the 18,000,000 urban dwellers and the surplus population in farming and mineral areas.

Establishment of sufficient industrial research laboratories, working in close alliance with private industry, to meet the demands of industrial development in the region.

Research in each State as to the types of industry

that may be successful in different parts of the State, and the extent to which local resources may be used.

Development of a pattern of industry for each State by the State planning board, with the advice of research agencies, chambers of commerce, development commissions, local planning commissions, and other competent advisers.

Establishment of a regional industrial committee composed of the chairmen of State planning boards, working with the Indianapolis field office of the National Resources Planning Board, to reconcile State industrial patterns into a regional pattern.

Development of coordination between fact-finding, planning, and research agencies and private industry, in order that industry, which finally decides where new industries will locate, may have essential facts readily available for its decisions.

Water

Water Power

Determination by the State planning boards of power needs and possibilities as a part of the State and regional industrial patterns.

Investigate the possibilities of power development in coal-mining areas, as an aid to industrial development.

Scrutiny of the relationship of power development at the Gilbertsville Dam of the Tennessee Valley Authority to the possibilities of industrial development in southern Illinois and western Kentucky by the State planning boards of Kentucky and Illinois.

Similar investigation by the Kentucky and West Virginia State planning boards of power-industrial relationships in other portions of Kentucky and West Virginia where TVA power is available.

Ground Water

Promote research on the ground-water and surface-water resources, including research on brines, to aid in their proper conservation and development. The quantity and quality of water available in a community frequently determines whether or not certain industries could be brought in. There is also great public need for such fundamental information.

Industrial Pollution

Continuation of research and cooperation with industry to control industrial pollution.

Flood Control

Readjustment of flood-plain uses in both urban and rural areas to provide additional channel storage in high-water periods without damage to property.

Transportation

Coordination of the present use and future development of all transportation facilities.

Development of the system of express and limited-access highways between important industrial and population centers.

Determination of primary and secondary roads and streets having significance in motor transportation regardless of governmental jurisdiction.

Adjustment of land use to bring about abandonment of many miles of unneeded and costly roads.

Adjustment of the highway pattern in relation to the industrial pattern of the States by State planning boards, and their coordination by the regional committee mentioned under "Industry," above.

Early completion of the St. Lawrence waterway to provide access to the Great Lakes of a large portion of ocean-borne shipping.

Completion at an early date of the Little Calumet-Grand Calumet waterway joining Lake Michigan with the Illinois River, including the deep-draft channel from South Chicago to Lake Calumet and the lake carrier-barge interchange terminal in Lake Calumet.

Completion of State airport plans by State planning boards, in cooperation with State air authorities.

Provide additional airports in accordance with a construction program based on State and regional airport plans.

Provide feeder routes to make air-traffic facilities available to all communities eventually.

Personnel

Development of a coordinated program of industrial personnel training by planning, industrial, educational, and labor authorities.

Housing

Development of a housing pattern adjusted to the industrial pattern of the region by the associated State planning boards.

Municipal Planning and Government

Development of formulas for control of development in suburban fringe areas by the Land Committee of the National Resources Planning Board.

Determination of methods of rehabilitating the central districts of cities by the National Resources Planning Board, in cooperation with State planning boards, local planning agencies, real estate, loan, and civic organizations.

REGIONAL DEVELOPMENT POLICIES

The basic objective of this plan is the utilization of the resources of the region in a manner that will promote their conservation and contribute to the welfare of all of the people who reside and work in the region or depend upon its activities. Attainment of this objective involves thorough understanding of many complex factors that influence regional prosperity. Land and the forests, which originally attracted people here, continue vitally to affect the welfare of the residents and regulate to a large extent the way of life of the region. Water, forming the Ohio River, the Great Lakes, and the Mississippi avenues of transport in the days of the pioneers, is an essential element of regional life and activity and involves far-reaching physical, social, and economic problems. Minerals—coal, iron, copper, building stone, clays—have exercised predominating influences upon human welfare in varying degrees and in many localities. Transportation has played a predominant role in the development of the region since its original settlement and is, today, a basic regional resource.

The early crafts brought in by the first settlers have expanded into a vast industrial pattern. Based upon the natural resources of the region and the traditional skills of its people, industry has itself become a primary basic resource. Intense industrial activity has brought more than half of the people of the region into cities, and these urban areas are also a vast resource, demanding the application of sound principles of conservation and development, so that they may contribute most completely to the welfare of their inhabitants and industries. The maximum use of these and other regional resources for the satisfaction of its people is dependent upon thorough understanding of the manner in which they may be used and yet not diminished in potential value. Many people and agencies have focused their attention upon separate phases of the problems of regional resources. It is the purpose of this plan to bring all of these separate plans and needs of the region into a single focus, and to see them as planes of vision in relation to each other. Thus may be gained an intelligent perspective of the activities of the region, forming a picture of the region of the future as we would like to see it.

Unity of thought throughout the region as to its ultimate development would be of distinct advantage to those in every kind of activity. This would lead to more concerted action toward the attainment of desirable goals for its continued improvement. It must be recognized at the outset that the plan must,

of necessity, be complex. It could not be otherwise in view of the great diversity of life within these seven States where people earn their livelihoods in all sorts of ways, from almost primitive tilling of submarginal land to most highly developed industry. Economic life within the region has advanced so far beyond merely agrarian pursuits during more than a century of industrial history that the simple types of plans suitable for areas that have a limited number of easily recognizable problems are wholly inapplicable. The plan for region 4, to be effective, must consist, not of many details, but of a group of broad policies, upon which regional thinking may unite and upon which the support of governmental and private development agencies may be based.

The highly urbanized character of the region, in which almost one-fourth of the population of the Nation reside and 60 percent of which live in cities, defies its subdivision into areas where problems may be treated in a similar manner. Some of the country's largest cities, including Chicago, Detroit, Cleveland, Milwaukee, Cincinnati, Indianapolis, Columbus, Toledo, and Louisville, are located in the region. St. Louis, Pittsburgh, St. Paul, and Minneapolis embrace large portions of the region within their trade areas. Sizeable cities are scattered widely, and it is evident that urban problems should be considered functionally for the entire region rather than attempting to focus attention upon smaller areas.

With respect to the land, there are several definable areas. These, shown on figure 1, are the agricultural regions designated by H. H. Bennett in his book, *Soil*.

Conservation

Within each of these areas, the original opportunities were associated with the land, its cover, and the minerals beneath it. These were natural resources and were there for the taking. The pioneers unwittingly destroyed many of these basic resources or depleted them so that they could not support the population. Their profligate use is the underlying cause of most of the problems in the region. But the picture is not wholly dark. The better land of the region, which comprises a very large proportion of all the good land of the Nation, is still producing surpluses. Even where the land is poor, there are many evidences of improved farming practices, and it has been demonstrated that even the very poorest land, in some instances, may be farmed profitably. A vast industrial economy has been erected upon the foundation of the land and min-

SITUATION MAP

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FIGURE 1.—Situation Map, 1938

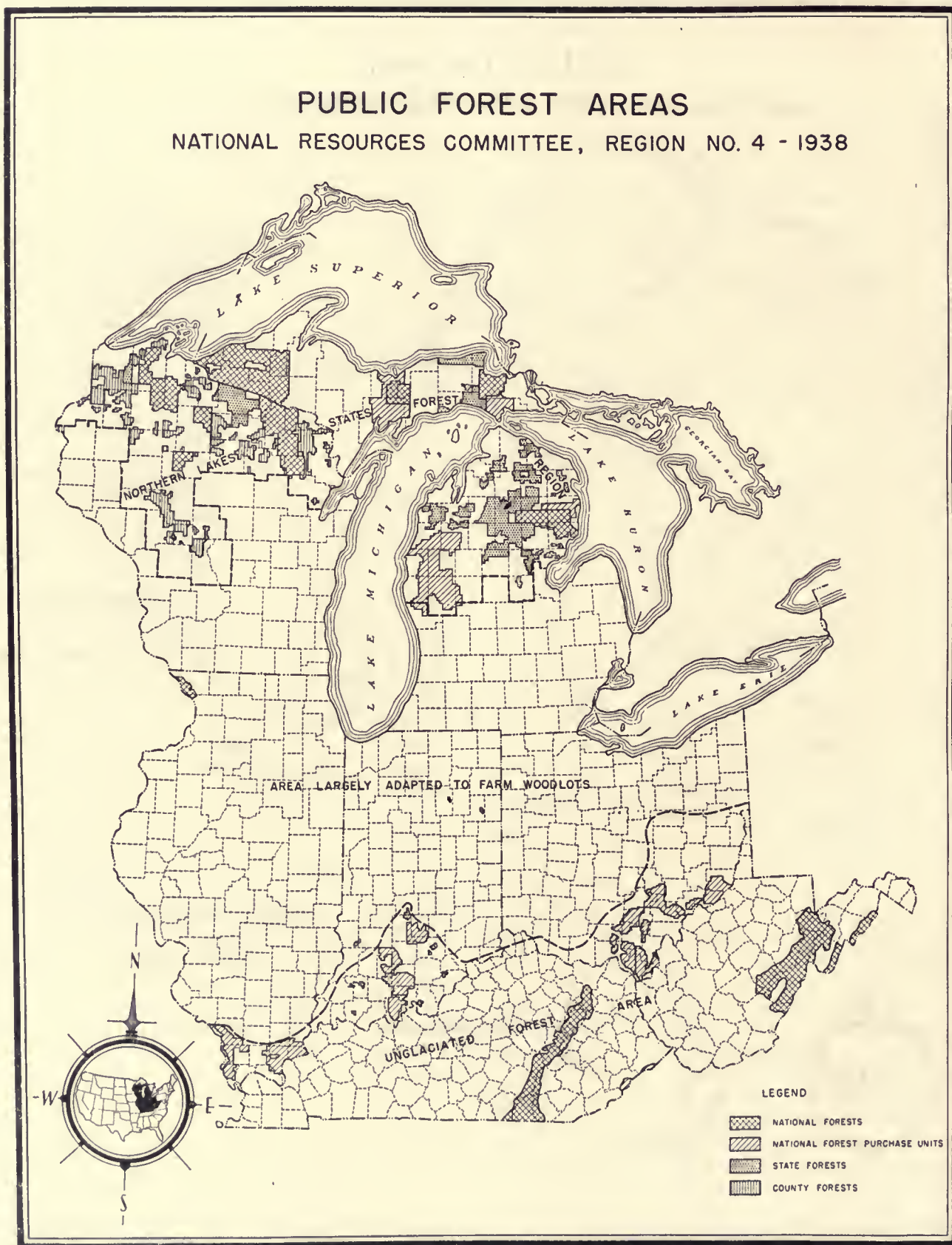


FIGURE 2.—Public Forest Areas

eral resources of the region and expanded so that it uses many of the raw materials from beyond this area. The highly favorable location of the region, with respect to markets, raw materials, reasonably safe distance from the seaboards, and superior transportation facilities, assures its continued industrial development. During the past 6 years, personal reconnaissance by the regional counselor of the National Resources Planning Board has extended into 540 of the 609 counties of the region, and into many areas far removed from well-traveled highways. Impressions gained from these visits, from discussions of regional problems with people in many lines of activity, and, specifically, with State planning agencies and Federal authorities have led to the definite conclusion that planning for importunate or urgent development is wholly incompatible with the character of the region and with the tenor of thought of its people, and its State and local governments. This does not imply that a great many people in the region are lacking in appreciation of the necessities for development, but expressions of individuals and officials indicate unanimity in the conclusions that the development of the region may best be promoted through continual research into the opportunities available to this complex population, accompanied by a strong educational program to develop the local understanding and team work essential to accomplishment. It is quite evident that the development plan must consist of a group of policies.

There is general agreement that the future welfare of the people of the region depends to a large extent upon adherence to these long-term policies:

1. Development of the use of the natural resources of the region in a manner that will conserve their potential capacity, insofar as conservation is compatible with utility.
2. Restoration of renewable natural resources that have been depleted.
3. Expansion of appropriate industry to provide greater diversified opportunities for employment throughout the region.
4. Provision of ample facilities for research and the equipping and educating of people to take advantage of employment opportunities.

Previous research by many institutions and educational efforts participated in by people throughout the region have so advanced the thought of the States and localities that there is general agreement upon the soundness of certain specific policies and demonstrated methods of conservation and development of resources. Upon other policies, there is still some diversity of opinion. The following programs for functional fields of regional action reflect the current composite judg-

ment of official and private authorities as to what policies should be followed in developing the region.

Forests

The forest of the region formed the first resource that was exploited. Vast lumbering operations were carried on in the Appalachian Mountains of West Virginia and Kentucky, the hills along the Ohio River and its tributaries, the northern portions of Michigan and Wisconsin, and to a large extent throughout the whole region except on the prairies of Indiana and Illinois. In the best agricultural sections, great areas of hardwoods were cut down and burned so that the land could be brought into production. The region was clothed with a natural forest that could have been maintained indefinitely for the use of succeeding generations.

Sound policies for the future dictate that much of this forest be restored, a process that would provide employment for many persons during the course of its regrowth, followed by continuous opportunities for forest work when it had been established upon a sustained-yield basis. The remaining areas of merchantable timber should be operated so as to preserve their potential values and establish the methods of sustained-yield cropping.

Figure 2 shows the areas that are suitable for forest development, the remaining areas of merchantable timber, the areas where a large proportion of the land should be wooded, and existing public ownerships of forest land. The undesignated areas on the map are predominantly agricultural, but within such districts there are many small tracts that are topographically or otherwise more suitable for forests than for cropping or pasture. The use of these tracts for farm wood lots or local forests should be encouraged through the research, educational, and extension services of State agricultural colleges and by acts such as the Indiana forest classification act and the county forest laws of Wisconsin.

There are 16 national forest purchase areas in the region comprising 13,375,624 acres as shown on figure 2. The Federal Government now owns 4,476,177 acres. Programs for acquisition of authorized purchase areas should be expedited. Work programs for restoration of the forests, using local relief and farm labor in all forest areas, should be instituted and expanded. Consideration should also be given to the policy of extending restoration activities to private lands under regulations similar to those of the Soil Conservation Service. Figure 2 also shows the location of county forests in Wisconsin and State forests in the region. The extent of Federal forest purchase areas in each State of the region is shown in the following table:

State	Net area approved for purchase of Federal forests	Approved areas purchased as of June 30, 1939
	<i>Acres</i>	<i>Acres</i>
Illinois.....	173,809	153,956
Indiana.....	34,000	33,542
Kentucky.....	421,280	374,602
Michigan.....	1,792,267	1,697,237
Ohio.....	38,754	35,110
West Virginia.....	899,473	880,622
Wisconsin.....	1,325,373	1,301,108

In order that the forest resources may be adequately restored, it appears to be desirable to expand the forest acquisition program to bring into public ownership the major portion of the land that basic land-use studies, especially those prepared by rural land-use planning committees or supported by zoning ordinances, have determined to be best suited for forest restoration. This calls for a closely coordinated program between local, State, and Federal authorities. However, it is evident that increasing attention is being directed to the use for crops of land in forest and other submarginal agricultural areas that have heretofore been regarded as useless. Improved methods of cropping have already been demonstrated in the poor-land areas, and some farms on very inferior land, using new methods, have shown better records than better land nearby. This points to the necessity of increased research into the use of such lands and the demonstration of new methods, accompanied by education of farmers on poor land. It further indicates that permanent public retention of all land purchased for forests may be unwise and that the Forest Service should be alert to improve agricultural methods and be ready to lease or convey appropriate land to individuals when they are ready and equipped to farm it profitably and in accordance with approved practices. This is particularly essential in those areas where large populations now exist and must be given greater opportunities for gaining a livelihood where they now live, and not at some more distant place where "the pastures are greener" but already used to capacity.

Restoration and operation of the forests will provide sufficient opportunities for full or part-time employment for most of the rural residents of the northern cut-over area, where population densities are small. In the Appalachian forests of Kentucky and West Virginia, similar work opportunities would provide valuable supplemental and full-time employment but would only be a partial factor in raising the economic level, because of the large families and dense population. Forest work in the South must therefore be considered as only one element of an opportunity program composed of agricultural, mining, industrial, and forest pursuits. Nevertheless, it is an extremely important element, and the only work opportunity that

will result in the restoration of a basic resource. Throughout the remainder of the region, the opportunities for forest work bear a relationship to all work opportunities inversely proportional to the quality of agricultural land.

In areas where open-pit or strip coal mining is practiced, programs are already under way or being considered for the establishment of forests on the stripped material as one method of rehabilitation. These programs are being developed through cooperation of private operators, Federal and State authorities. There is general agreement that reforestation of the strip piles would be highly desirable in many instances, and the work opportunities connected therewith rank high locally. Figure 3 shows the location of strip-mine areas.

As the forests were exploited, large numbers of wood-working industries were established throughout the region. Many of these still operate, but most of them disappeared as the forest products diminished. Replacements for these industries are greatly needed. Restoration of the forests to a sustained-yield basis will eventually bring back some manufacturing. Extensive research is being carried on by the Forest Products Laboratory at the University of Wisconsin, particularly in the use of young trees and inferior species. A wide variety of useful products and new structural uses has been developed, including plastics of high quality. It is highly desirable that the research work of this laboratory be expanded, and as new products are proven to be valuable, that steps be taken to establish new industries near the forests, which will provide additional work opportunities for local residents.

Agriculture

More than three-fourths of the region is now devoted to agriculture. This is divided generally into the categories of the Corn Belt, dairying, general farming, and subsistence farming, as shown on figure 4. Many acres of inferior farm land, mostly within recommended forest areas, should be retired from cultivation as discussed above under "Forests," and the struggle for existence on self-sufficing farms displaced by work opportunities in the forests or in supplementary industrial programs. The remainder of the land of the region falls into two classifications, namely, crop land and pasture land. The problems of maintaining the quality of these two types of land are quite different, but their operation is often closely associated. The predominance of one type or the other determines to a large extent the basic economy of the locality.

Pasture Land

Areas in which pasture land is predominant include most of the States of West Virginia and Kentucky, southern Illinois and Indiana, eastern and southern

COAL MEASURES AND PRODUCING AREAS

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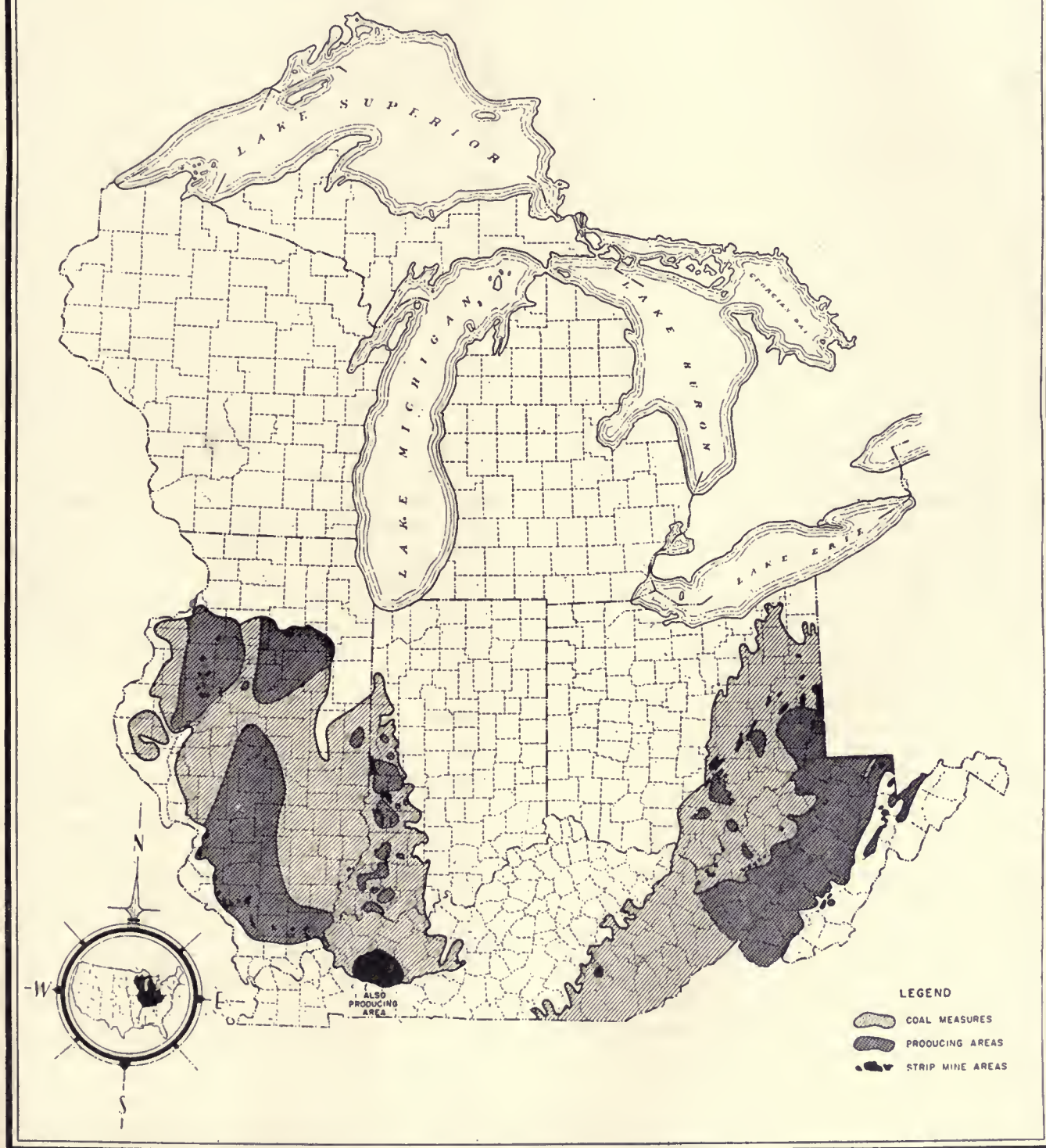


FIGURE 3.—Coal Measures and Producing Areas

Ohio, southern Wisconsin, and northwestern Illinois. The maintenance of permanent pastures and sufficient cropland to produce winter feed are essential elements of the livestock economy of the region of predominant pasture land. The desirable size of the farms will depend upon quality of the pastures. Therefore, if the maximum number of people are to be supported by use of the land for the raising of livestock, it is essential that programs in the livestock areas be directed toward continual improvement of pastures. A major part of this program of pasture improvement should be accomplished through education based upon the research of the agricultural colleges and brought directly to the farmers through the established State extension services. The educational program should be supplemented by expansion of the demonstration projects conducted by the Soil Conservation Service.

In the portion of the B8 and D3e areas shown on figure 2, which lie in Indiana and Ohio, there are more than one-quarter of a million acres that are not suited to farming but would be more productive in pasture than in woods. It has been suggested by some agricultural authorities that this land be purchased by the public and regressed instead of reforested, based upon the theory that under private ownership these lands cannot be retired for rehabilitation for the same reasons that individuals cannot afford to reforest lands themselves. If these lands are to be kept from deteriorating to the point of uselessness, they must be restored as pastures, and this would have to be done at public expense but could be followed by leasing or resale of these lands for private operation. These lands would cost from \$9 to \$18 per acre, and an equal expenditure for public works would be required to put them into a state of production so that they could be used by farmers of the communities in which such tracts would be located. This situation also exists in most of Kentucky and West Virginia, and in areas on flatter land, such as the tight clays of Illinois.

The economic situation varies markedly in the pasture areas of the region. Normally, a livestock economy denotes a light population, and the ultimate development of livestock possibilities would result in a lowering of population density. In the southern reaches, the areas most suitable for livestock are interspersed with small subsistence farms, and the number of people on the farms cannot, under present methods, be supported at a desirable standard of living. Reversion to livestock will displace many of these self-sufficing farmers. They must seek other opportunities. Those who are near the forests may expect to secure some work in the woods. Those who remain on the land may improve their situation by acquiring more land so that they may operate adequate areas of cropland to supplement pastures and to feed themselves.

But the large portion of the rural residents can only improve their lot by supplemental industrial employment. However, the conviction is growing that these lands can be profitably cropped in the manner discussed above under "Forests."

It must be recognized that most of the residents of the southern agricultural areas are not skilled industrial workers. Younger people and those susceptible of training may migrate to established industrial areas and be successful, but there is a definite need in these regions for forms of industry for part- or full-time operation, that will be commensurate with the skills of the people of the area. These may be home or handicraft industries or small industries utilizing local products. Research leading to an industrial program is a responsibility that should center in the State universities, cooperating with the Forest Service, the State planning boards, and other research agencies. Promotion of the program should be carried on by State development commissions cooperating with State chambers of commerce and local official and private authorities.

In the dairy sections of the region, as shown on figure 4, the slopes are not so steep, and the pastures are of higher quality. A high type of economic development has been reached in the dairy areas, particularly in southern Wisconsin. Normal dairy operations within economical marketing distances of large urban centers have been supplemented by processing plants that provide employment for many persons. Much of this area is also suitable for the growing of truck crops and farm products for canning, thus providing additional industrial employment. These areas, as a whole, do not constitute problem areas but serve, rather, as good examples of balanced agricultural-industrial development.

Cropland

The area designated on figure 4 as the Corn Belt contains 30 percent of the grade 1 and 23 percent of the grade 2 land of the Nation. In this area, corn is grown and fed to hogs and cattle, and grains are produced for sale. A great variety of crops is raised. Thriving canning plants consume great volumes of tomatoes, corn, peas, and other vegetables. Recently, a train of 43 cars of Indiana tomato juice was shipped to New York at one time. Many special crops are raised in the muck lands of northern Indiana and southern Michigan, including peppermint, onions, and excellent vegetables. No higher type of agricultural economy exists. Yet in various parts of the area, erosion has taken place, and soil fertility has been depleted through too intensive cropping. Not long ago a prominent agricultural economist stated that 80 percent of the farms in Ohio were not being operated so as to conserve the soil, but the same man lately expressed encouragement at the

GENERALIZED TYPE - OF - FARMING AREAS

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FIGURE 4.—Generalized Type-of-Farming Areas

effects of the educational programs that have been under way. In spite of unwise cropping, the good land in this region still produces surpluses. Insofar as the land itself is concerned, the Corn Belt is not a problem area, but continued education is needed to bring about better crop rotations and control of sheet erosion. The research programs of the agricultural experiment stations and the educational efforts of the extension services of the State universities should be expanded and strengthened to bring about better use of cropland and the growing of more diversified crops and products suitable for industry. This should include demonstration projects and the expansion of technical services available to land-use planning committees. It is also emphasized that additional personnel is needed in county agents' offices.

Mechanization of the farms has developed an employment problem of no small proportions. Whereas formerly four or five men were needed to operate an average Corn Belt farm, one or two can now perform the work with mechanical equipment. The farm labor released thereby must find employment elsewhere. Even with more intensive cropping to produce agricultural crops for industry, only a few more men will be needed on farms. The greatest opportunity for the young people of the Corn Belt who are not needed on the farms will be found in industry, and their generally good health and education fit them for a high type of industrial work. Cities of considerable size are scattered over the Corn Belt, and such expansion of industry as takes place will doubtless be in those cities that have an industrial tradition. It is evident that there is close association between good farm land and industry.

Bordering the Corn Belt on both the north and south are areas devoted to general farming as shown on figure 4. The northern area extends into Michigan as far as the cut-over region. It has many of the characteristics of the Corn Belt, but the land is not so good, the farms are smaller, and drainage is a problem in much of the area. There is much more land submarginal for crops. On the south, the general farming areas are definitely problem areas. Where there are areas of reasonably good farm land, the farms should have enough cropland to support the farm family living upon it. At least half of this southern area should be returned to forest, and at least one-fourth should be devoted to pasture, leaving one-fourth or less for cropping. The principles and remedies outlined heretofore for the livestock areas south of the Ohio River apply in appropriate degree to this area, but the standards of living and education are higher in the regions north of the Ohio River, and the younger elements of the population are thus better fitted to go into industry.

The primary problem of cropland in the northern

cut-over area is occasioned by the size of farms. There are some 18,000,000 acres suitable for cropping. Each farm should have an area of cropland sufficient to maintain a family. The Farm Security Administration has been authorized to expend \$700,000 in assisting farmers in the Wisconsin and Michigan cut-over regions to secure enough cropland to support a family. It is expected that this expenditure will produce successful results, and when its value has been demonstrated, the program should be expanded and extended to the southern hills, where the size of farms is too small for a subsistence level.

Land Classification

It is generally recognized that thorough and accurate classification of land is a prerequisite to a sound program of land use. The agricultural experiment stations and the Department of Agriculture have been devoting much thought and effort to rural land classification for many years. But it has long been recognized that the essentials of the land-classification program must be brought to the attention of the owners and operators of farm land. The device of securing the advice of representative farmers upon the most desirable use of farm land has proven very successful. Land-use planning committees have been set up in most of the counties of the region. Composed of representative farmers under the general direction, but by no means the compulsion, of the county agricultural agent, a representative of the Bureau of Agricultural Economics of the Department of Agriculture, and an extension worker from the State agricultural college, they have placed on maps themselves their recommendations for the use of all of the rural land of the county. Many of these reports have been completed and published and given wide circulation in the counties. From the county reports, State maps showing recommended land-use patterns are being made. As a basis for future land-use programs and adjustments, the work of the land-use planning committees is of inestimable value. The committees should be continued and keep their work up to date.

There are five methods of bringing about the desired land use in each county, namely, by—

- (1) Education;
- (2) Zoning;
- (3) Soil conservation districts;
- (4) Public ownership;
- (5) Financial assistance to farmers.

It is recommended that the research, educational, and extension services of the State agricultural colleges be strengthened, where necessary, to bring about a widespread understanding of the principles of proper land use. As a definite part of the educational program, the demonstration projects of the Soil Conservation Service should be continued and expanded.

Zoning has proven to be a successful device to check unwise use of land and unwarranted settlement of land unsuited to agriculture. It is not a method whereby adjustments in land use may be effected but prevents the spread of improper land use. Wisconsin has been a leader in rural zoning. Starting with simple ordinances in the cut-over counties designating forest zones closed to further settlement and agricultural areas, it has spread to more populous counties in the southern part of the State, where more diversified classifications have been adopted. Michigan and Illinois have passed a few county zoning ordinances, and Indiana has the authority to zone but has not yet exercised it. Eventually, every county should have a zoning ordinance. Before this can be accomplished, enabling acts of State legislatures will be required in Ohio, West Virginia, and Kentucky, and the Indiana act should be strengthened. The same principles that were outlined under "Forests" relative to permanent use for forests apply to permanent zoning of forests. It is altogether possible that research may discover ways in which land now relegated to forests may be profitably cropped, and when such research has been proven in practice, appropriate lands now zoned for forest should be released for crop use.

A second method of bringing about desired land use is the soil conservation district, which, under authority of a State enabling act, permits landowners to form a district of suitable size and adopt a land-use program participated in by the landowners in the district that will insure adequate soil-conservation measures in the district. All of the States of region 4 except Ohio have passed State enabling acts for soil-conservation districts. Based upon recommendations of the land-use planning committees, these districts should be formed where authorized by State enabling acts.

Public acquisition of land unsuited to agriculture is the most effective way to bring about land-use adjustment. There are three ways in which land may be acquired by the public, namely, by outright purchase, gift, and by tax reversion. Federal acquisition would be by purchase or gift only. The forest purchase program should be hastened, and in zoned counties, nonconforming uses in forest areas should be among the first lands acquired.

Acquisition of land by tax reversion has been most effective in Wisconsin, where the land reverts counties, and in Michigan, where it reverts to the State. Indiana and West Virginia also have tax reversion laws, but the other States of the region do not. Legislation establishing sound policies for reversion of tax-delinquent land should be enacted in Ohio, Kentucky, and Illinois.

The costs of local government are among the chief financial burdens of the counties in which land sub-

marginal for agriculture exists. A major portion of such costs are occasioned by the expense of maintaining roads and schools, and the transportation of pupils for the benefit of isolated settlers. Much of the isolated land is tax delinquent and by tax reversion returns to the public. Wisconsin counties, through land committees of their county boards, have acquired many of the isolated holdings, either by reversion or by trading county-owned land closer to settlements for the isolated holdings, and have thus been able to abandon roads and schools and reduce governmental costs. Each State should profit by Wisconsin's experience and, under either State or county auspices, bring isolated or scattered rural populations into closer settlement wherever possible.

Recreation

This region possesses land and water areas that offer abundant opportunity for recreational development reasonably close to large concentrations of urban population. West Virginia, with the highest average elevation east of the Rocky Mountains, contains areas of splendid scenery and forested wilderness. Kentucky has attractive scenery and beautiful streams. The Illinois Ozarks and the hills of southern Indiana and Ohio are increasingly used for recreation. The lakes and woods of Wisconsin and Michigan have long been a mecca for vacationists. In addition, there are many fine developed and potential recreational sites throughout the better farming areas of the region. Increasing throngs of tourists pass through the region and demand all sorts of travel accommodations, food, and shelter. This is a great industry in itself, will continue to increase, and provides work opportunities associated with land and water areas. The provision and operation of recreational sites and public facilities is a joint responsibility of the National Park Service, the Forest Service, and the State agencies. The States of Wisconsin, Illinois, Indiana, and Kentucky have completed recreation plans under the direction of the National Park Service. Michigan is preparing a plan. Ohio has not cooperated in this endeavor, and West Virginia has ceased to work on its plan. Both States should prepare such plans. These plans direct attention to the need for provision of many more recreation areas in the vicinity of large population centers. Recommendations for specific locations have been avoided for various reasons, but there is a general agreement that this is a primary need of the region.

The recreational plans also point out the possibilities for parkways along the principal streams of Illinois, Wisconsin, and Indiana. As a general principle, river forests or parkways should be established along the larger streams throughout the region. The maps contained in the Wisconsin and Illinois reports show the

location of proposed parkways, but the Indiana recommendations have not been made public. There are great opportunities for parkway development in Kentucky, Ohio, Michigan, and West Virginia also, but specific recommendations have not been made by the States.

A planning committee has been working for 3 years upon a proposed parkway along the Mississippi River from Lake Itasca in Minnesota to the mouth. Nine States have passed enabling acts permitting them to cooperate in the development. It is proposed to have a complete survey made of the parkway by the National Park Service. This has not been started, and definite recommendations for the parkway must await the completion of the survey. It extends through four regions and in this region affects Wisconsin, Illinois, and Kentucky.

Water areas provide suitable sites for recreation. In the northern sections of Wisconsin and Michigan small lakes abound. These have been used for many years for recreation, but drainage operations have lowered lake levels so much that critical study of the problem of maintaining reasonable levels is being undertaken in Wisconsin and Michigan. The shores of the Great Lakes afford sites for recreation, but very little of the shore is in public ownership. Acquisition of beach reservations to serve the large urban populations is very much needed, and closely associated with it is the problem of shore or beach erosion. Beach erosion is particularly acute along the south shore of Lake Erie and the lower end of Lake Michigan. The National Beach Erosion Board has given attention to the general principles involved, the district engineers have made preliminary investigations of acute situations, and local authorities have presented the problem for consideration by appropriate drainage-basin committees.

The reservoirs of the Corps of Engineers' plan for flood control on the Ohio River will provide vast recreation possibilities. Each of these reservoirs will contain a good-sized recreation pool, suitable for various forms of water recreation, including wildlife conservation. Certain reservoirs, such as the Tygart Reservoir near Grafton, W. Va., built for low flow control include greater water areas than the flood-control reservoirs and have already attracted throngs of sightseers and recreation visitors. The large reservoirs are being supplemented by numerous recreational lakes in the forest areas of the region and in State parks and land-retirement areas. This program should be expanded under the direction of the State conservation departments. Development of recreational land and public facilities should be in accordance with the principles and recommendations of these plans.

The regional and local value of recreational services as employment possibilities depends upon the quality

of such services. This necessitates State regulation, and inspection and educational programs to instill into providers of recreational services and people generally an appreciation of the long-term value of high standards of service as a contribution to stabilized work opportunities in this field. It is specifically recommended that the research, educational, and extension services of State universities conduct State and local conferences on this subject to bring about higher standards of recreational services.

Wildlife.

The land and water areas of the region were the original habitat of a wealth of fur-bearing and game animals and fresh-water fish. In the Report of the Land Planning Committee to the National Resources Board in 1935, the following statements were made:

Wildlife is as essentially a product of land (or land and water) as is timber, agricultural crops, or domestic livestock. A multitude of kinds, bearing importantly upon human welfare, are especially adapted to various kinds of habitat, from dense forest and open range to cultivated fields, water and marsh. It follows, therefore, that wildlife cannot be ignored in any comprehensive, well-considered plan for land utilization. Mammals, birds, fishes, and other wild vertebrates constitute a major national resource that is becoming more generally appreciated, as evidenced by increasing interest in every phase of nature study.

Many of the various forms, fur bearers and fishes especially, are of direct economic value. An example is the income derived from the sale of hunting, trapping, and fishing licenses; the furs of course have a great commercial value also, and in some cases the meat supplies a highly prized form of food. That the meat and fur value of wild animals and birds is considerable is indicated by an estimated total for 1 year of more than \$190,000,000 for the whole country. Capitalized on a low-percentage basis, the total value of wildlife would far exceed \$1,000,000,000. Other economic values are receipts from the sale of hunting and fishing equipment, including guns, ammunition, fishing tackle, and clothing, expenditures of sportsmen for transportation, board, hire of guides, and for hunting and fishing privileges on private lands. To the foregoing may be added the output of the fur trade, including the fur-manufacturing industry, the annual expenditures for the maintenance of the numerous and widely distributed hunting and fishing clubs; also the general expenses of tourists and others attracted primarily by an abundance of wildlife. It is these various wildlife values that go to make up the estimated grand total of at least \$1,100,000 annually.

Last, but not least, should be mentioned the incalculable value of wildlife, chiefly birds, as destroyers of the insects that prey on agricultural crops and forest trees.

Development of wildlife, both from a recreational standpoint and as an income possibility, is an essential element of the regional development plan. Commercial fishing also demands careful regulation and planning. The recommended treaty regulating commercial fisheries between the States bordering on the Great Lakes and the Dominion of Canada should be ratified by all parties at once, in order that every facility for restoring this resource, not only because of its food

value, but as a source of employment and income, may be assured and hastened.

Wildlife, as well as commercial fisheries, is one of the renewable resources of the region. Its reestablishment will provide another source of income and employment in areas where this need exists. Wildlife development is a joint responsibility of the Fish and Wildlife Service of the Department of the Interior and the appropriate State agencies, and should be continued.

Minerals

Mineral resources in the area under discussion are principally coal, petroleum, fluorspar, sand, gravel, limestone, and clays. Changes in the nature of the coal and energy market have brought about a decline in coal demand, accompanied by depressed conditions in coal-mining communities. There is, therefore, a surplus of skilled mine labor that is loath to move out of the coal community. Investigations as to the possibility of expanding markets, developing new uses for coal in industry, and rehabilitating displaced miners in other work are urgently required.

A specific example of freight rate and market readjustments to be desired can be found in the coal-mining districts in western Indiana, southern Illinois, and western Kentucky, where there is a problem of a very slack summer season. Short-time programs for the revival of coal-mining activity call for the development of summer markets, mainly through the development of summer river traffic to the markets of St. Paul, Minneapolis, and Chicago, and, over Lake Michigan to Wisconsin and Michigan ports, by way of the port of Chicago. For the latter, a reduction in freight rates from mining district to the port of Chicago for lake destinations.

The development of a fuel product from Illinois coal acceptable as a domestic fuel in Chicago and St. Louis will bring about a more extensive utilization of these nearby coal fields.

A long-time program for the coal districts assumes that coal will become increasingly important as a chemical raw material, and for this, the coal districts must be examined with reference to their suitability as locations for chemical manufacturing plants.

Structural-clay products are among the depressed industries, although not necessarily restricted in location to a depressed district or region. Clay resources are abundantly available in the entire area covered in this survey. Moreover, it is a region where timber resources are scant or original timber stands have been depleted. A substantial portion of annual construction is accomplished with materials shipped from distant production points. The farm, particularly, has been one of the greatest markets for lumber. The depletion of adequate supplies of softwood in areas east of the

Rocky Mountains suggests the use of building materials from mineral products as an alternative. Raw materials and local industries for the manufacture of structural-clay products are distributed through the area. This is distinctly a local industry, and new vigor in this industry is conditional upon education in the construction and use of clay products.

In the limestone counties of south central Indiana, a serious social and economic problem exists because much of the processing of building limestone has been shifted from the location of the limestone itself to the various job sites in the cities. An investigation of the wisdom of relevant railroad freight rates and of the differentials in labor costs and regulations between the two locations might well lead to at least partial solution of the problem.

A problem of chemical research is that involving the fluorspar deposits of southern Illinois and western Kentucky. Certain communities in the fluorspar districts of these two States are dependent upon activity in fluorspar mines for a livelihood. Hitherto, the principal outlet for this material has been in the steel industry, and employment in these communities fluctuated with the rise and fall of steel output. The cyclical nature of demand can be moderated somewhat by creating a diverse market for this product. This is the objective of research now in progress on fluorspar and its compounds.

The problem in the iron and copper mining areas of Upper Michigan is even more acute. These mines are unable to compete with open pit mines in other regions. Their operation is further hampered by tax laws, which prevent them from mining during the winter and building stock piles in advance of summer water transportation on the Great Lakes, because stock piles are assessed for taxation in the spring. It is unlikely that many of the miners will find employment in the mines, and they must seek jobs elsewhere. They may fit into the reforestation program, but there will still be need for some form of industry.

Industry

The strategic location of region 4 with respect to population and transportation, coal, raw materials, and water influenced the development of an industrial economy at an early date. The State of Indiana is typical of much of the region, and there may be found in the area a wide diversity of manufacturing. Some kind of industry exists in every one of the 92 counties of the State.

The industrial areas of the State manufacture a wide variety of articles and products. More than 64 percent of the population of Indiana lives in cities, and most of these people depend upon some form of industry or services to industry for a livelihood. The same is true

of Illinois and Ohio and of most of Wisconsin and Michigan.

Agriculturists, geologists, and industrialists agree that research is greatly needed. New developments will aid agriculture and urban and mining interests. Mr. Harry J. Reed, new dean and director of the College of Agriculture and the agricultural experiment station at Purdue University, is quoted in the Preliminary Report of the State Planning Board of Indiana, 1934, as follows:

The fields and wood lots of Indiana can produce enormous amounts of raw materials suitable for industrial purposes as rapidly as the knowledge regarding useful byproducts can be developed. A great field of research lies ahead of the agricultural experiment station along these lines. It is essential that a greater knowledge of new uses for farm products and wastes now occurring on Indiana farms be developed. Mr. Reed stated emphatically that in his opinion the future of Indiana agriculture depended upon the utilization of waste products in manufacturing. This would also include the growing of new products which would be valuable for manufacturing. In the light of present understanding the use of soybeans offers great possibilities. This crop grows especially well in Indiana and should therefore be profitable to the farmer, and its development should provide employment for many people in industry.

At Indiana University the State geologist is being continually called on for advice as to the value of Indiana resources of a mineral nature. The ceramic laboratory there makes analyses and reports for those seeking information in regard to minerals. There are private organizations also which are seeking to perfect industrial processes which will offer new outlets for industry and which would also in turn afford employment for many people.

The year 1930 witnesses the incorporation of an organization designed to promote industrial research. This is known as the Purdue Research Foundation. It was created under authority of the State with a contractual agreement which is beyond the dangers of political change. The foreword in bulletin No. 1 of this foundation gives an idea of the high purpose for which it was created. Mr. G. Stanley Meikle, who is the director of the foundation, made the following statement, "The past century has witnessed the evolution of a new epoch in the history of civilization. Science and new technology have begun to lift the burdens of hardship and unnecessary toil from the shoulders of man. He is being released to enjoy the higher values of life which are being created with increasing rapidity as he expands his control over the endless resources and infinite power in nature. The continued development of these new tools of civilization, to be used as the means to an end, is largely dependent, not upon wealth of resources, but upon wealth of human ingenuity and intelligence applied to adjust mankind to his environment. Science and learning are being forced into the sphere of practice. An increasing responsibility in the selection and training of the scientific and technological leaders of the future is being placed upon the institutions of learning. An appreciation of the trends of this new era, and a realization that the success of scientific and technological development is largely dependent upon organized effort, inspired the founders to make possible the Purdue Research Foundation."

Whereas the primary purpose of the foundation is to cooperate with industry in developing new processes and new methods it also has in view a much broader purpose. This purpose is the development of human resources. It will provide opportunity for students and faculty members with research ability to proceed under competent direction and with adequate funds to

the development of their ideas. This will tend to uncover ability and originality and will make it possible for a high order of intelligence to be applied to industrial problems. While the foundation is located at Purdue University, it is not intended to limit its opportunities to students of that university alone, but all students are invited to participate, as funds become available.

The articles of incorporation establish the foundation to promote educational purposes by encouraging, fostering, and conducting scientific investigations and research by acquiring and disseminating knowledge thereto; and further, both in connection with Purdue University and independently thereof, to foster and encourage education and learning in science, agriculture, and mechanic arts and to promote the liberal and practical education of the industrial classes of the several pursuits and professions of life. The foundation may also acquire property, may secure patents on processes and articles developed, and conduct its business in a practical manner. Its directors are composed of representatives of industry as well as trustees of the university, alumni research councilors and research members. It is quite evident that this is an organization well equipped to develop new industrial processes which will give employment to a large number of people and which will develop human resources.

Much that has been said in the Indiana report applies with equal appropriateness to Illinois, Ohio, and the southern portions of Wisconsin and Michigan. In West Virginia the chemical industry has been highly developed along the Kanawha River, where conditions are especially favorable for this type of industry. In the Wheeling and upper Monongahela areas, in reality adjuncts of the Pittsburgh district, there are steel, glass, and pottery plants and associated heavy industry. Elsewhere, manufacturing in Kentucky and West Virginia is confined largely to the vicinity of the Ohio River, where water transportation is available and rail-freight rates are influenced by competitive water-shipping rates. Only a few industries are found in the cut-over regions of northern Michigan and Wisconsin. The densities indicate very closely the spread of industry in the region.

The foregoing sections of the regional development plan conclusively demonstrate the necessity of greater industrial development in all portions of the region if employment is to be stabilized, not only for the 18,000,000 or more urban dwellers but also for the surplus labor in both the good and the less favored agricultural and mineral areas. The prosperity of industry is directly proportional to the strength of both domestic and foreign markets. The regional plan cannot guarantee such markets, but it must be assumed that they will exist as a part of the structure of the regional industrial economy. Any other assumption would be an admission that natural opportunities are diminishing and would obviate the necessity of planning for regional industrial development. The favorable location of region 4 for industrial development becomes more apparent in view of the world situation and the necessity of locating vital industries far distant from the seaboard.

Three basic steps that must be taken as prerequisites for industrial locations are as follows:

1. Research to determine new products and methods of manufacture.
2. Research to determine the types of industry suitable for location in various parts of the region where different skills are available.
3. Determination of locations for actual industrial plants.

The determination of new products and methods can best be reached in established industrial research laboratories. Among existing establishments of this character in the region are the aforementioned Purdue Research Foundation, a similar organization at the Ohio State University, the engineering experiment station at the University of Illinois, the Forest Products Laboratory at the University of Wisconsin, the research laboratories of General Motors Corporation, Dow Chemical Co., at Midland, Mich., and many others. An essential element of the industrial plan is the establishment of sufficient well-equipped industrial laboratories, working in close alliance with private industry, to meet the demands of industrial development in the region. In such laboratories, not only general research but also research peculiarly applicable to each State and its potential resources may be carried on, and should include social and economic research related to industrial development. The new mineral-industries building at West Virginia University, for which a contract has just been awarded, will house such an institution for mineral research.

In each State there should be vigorous research into the types of industry that may be established successfully in different parts of the State, and the extent to which such industries may use local forest, agricultural, and mineral resources and give work to local people. This necessitates an understanding of the kind of work that people of the area are capable of doing or are being trained to do. It may be determined that, in some localities, handicraft articles are the highest type of manufacture than can be successfully produced. In many other portions of the region, industry requiring the highest skill will be appropriate. The traditions of good craftsmanship that exist in a large portion of the region are a valuable factor in developing an industrial program. The objective of this plan is to design a pattern of industry covering the entire region. The State planning board of each State should be responsible for the industrial pattern for its State and, in reaching conclusions, it should have the advice of research agencies, State chambers of commerce, State development commissions, city and county planning commissions, and all others who are competent to offer advice. In this region, where the development of industry is a basic necessity for the welfare of the people, the State

planning boards should regard this as a primary objective. The chairmen of the several State planning boards should act as a regional committee to reconcile State industrial patterns into a regional pattern. In this they would have the assistance of the staff of the Indianapolis field office of the National Resources Planning Board.

The location of actual industries is a task for private industry itself. The regional industrial pattern and those of the States would also provide for industry much of the basic investigational data that a well-organized industry secures before locating a new plant, including information as to available buildings and plant facilities, quantity and skills of available labor, transportation facilities, water supply, power facilities and rates, housing facilities, etc. Private industry would, in every instance, make the decision as to where it would locate, but public agencies and promotional organizations should be in a position to provide regional and local facts upon which the decisions of private industry could be based. The development of coordination between the fact-finding public agencies, those that prepare the State industrial pattern; the semipublic development associations, such as chambers of commerce; and the industries that use the data, is an essential element of the regional plan and should be a major objective of the State planning board and associated local planning agencies.

Water Power

The maintenance of a constantly progressive development of the industrial pattern demands a correlated power program. In the interest of conservation and maximum use of transportation facilities, power sources will include all of the feasible hydroelectric possibilities. Except for the mountainous areas in the southern portions of the region, the topography of the region is generally unfavorable to water-power development when considered in the light of commonly accepted criteria, which delimit economical feasibility of water power to a comparison with the cost of equivalent steam production. These criteria are invalidated by broader concepts of multiple-use potentialities and by the possibilities of releasing fuel-carrying capacity of transportation systems in congested metropolitan areas. Undeveloped water-power sites that are suitable for peak-load plants exist near to the industrial load centers in Ohio, Illinois, and Indiana. These should have a proper place in the future pattern of industry.

The creation of new industrial centers in the southern portion of the region will be possible through the coordination of newly developed water power with fuel plants located close to the mines. A specific example of such hydrosteam associations lies in the southern

Illinois section. Here hydro power from the Gilbertsville, Ky., dam of the Tennessee Valley Authority, operating in conjunction with mouth-of-mine fuel-power plants, favors future industrial expansion for which transportation facilities are well developed. Similar possibilities exist for the remainder of the Kentucky and West Virginia sectors. The inland position of the region is favorable for defense objectives.

Ground Water

Recognition of the importance of ground-water supplies to the maintenance of industry is of utmost consequence to the future of the region. Favorable temperatures and the mineral quality of ground water, including brines, have positive and negative values peculiar to the continued operation of certain industries that cannot readily utilize surface supplies in their processes. The indiscriminate use of ground water for purposes that might be served equally well by surface supplies must be curtailed in order to achieve maximum values for industrial progress.

The region of the future, therefore, presents a coordinated picture of proper regulation of water by which the supply and demand are favorably balanced and allocated for the attainment of maximum economic and social benefit. The alarming dissipation of ground-water sources at the present time indicates the need for concentration of thought toward the solution of the immediate problem if the forward progress of vital industrial development is to be maintained.

Reference is made here to Bulletin No. 6 of the Wisconsin State Planning Board which outlines a plan for utilization of storage capacity in the Wisconsin River to provide additional water supply in the Fox River by diversion at Portage, Wis. This plan would insure adequate water supply for the industries in the Green Bay-Fox River district.

Industrial Pollution

Industry in this region, in common with industry all over the Nation, has a definite obligation not only to other industries but to the public, to return water, which has been used for industrial purposes, to the streams in a reasonably pure state. In this region of heavy urban population, this is particularly essential. State sanitary engineering departments and the Public Health Service have found that industrial waste pollution can best be controlled through cooperative efforts with industry. Research is developing ways in which many industrial wastes may be profitably reclaimed and pay all or a large part of the cost of controlling pollution. These efforts should be expanded as rapidly as research points the way to solutions.

Flood Control

The ideal future region must necessarily offer complete insurance against flood damage. The attainment of such a goal requires drastic realignment of existing philosophy in matters regarding human occupation of flood plain areas. This is particularly true in regard to existing submarginal agricultural areas. Continued protection of these areas to maintain the status quo militates against the best interests of the region and of the United States as a whole. Large sections of region 4 are susceptible to excessive flood damage due to an overdevelopment of land that should be utilized for channel storage during high-water periods. In the case of urban developments, the restoration of these lands to the river channel is much more difficult and less justifiable than is the restoration of agricultural land similarly affected. However, readjustments should contemplate reasonable readjustment of both urban and agricultural areas wherever possible. The resultant ideal balance, together with economic protective measures, can be made to achieve the desired end of complete protection.

Transportation

Rail

Railroad facilities in region 4 are adequate for all purposes from the standpoint of trackage, yards, terminal facilities, repair shops, motive power, rolling stock, and personnel. It is estimated that the facilities are not utilized to more than one-half capacity. There are a few counties in the region that have no rail facilities, but only minor physical additions would have to be made in order to meet the exigencies of an expanding industrial program, even the added load of national defense. There will be need for joint rail, water, and highway terminals to supplement those already in use. While these are problems more of transportation management than of physical development, they should be considered as part of the regional and State industrial patterns.

Highways.

The basic need in highway transport is the development of a system of express and limited-access highways between important industrial and population centers. As of today, the highway system is adequate, but it is anticipated that traffic will double in the next 20 years. The present exigencies of national defense are likely to increase traffic 25 percent or more. The Bureau of Public Roads states that rural and urban trunk-line roads have only 16 percent of the total mileage and carry 60 percent of the traffic. Local city streets total 6 percent of the mileage and carry 30 percent of the traffic,

whereas county and local rural roads account for 78 percent of the mileage and carry but 10 percent of the traffic. Increases in traffic will probably develop in the same proportions. In a recent address by Mr. Murray Van Wagoner, State highway commissioner of Michigan, before the meeting of the American Society of Civil Engineers on September 7, 1939, these significant statements were made:

The principal objective of highway planning should be a determination of primary and secondary roads and streets having the utmost of significance in motor-vehicle transportation regardless of whether they be under the jurisdiction of the city, the county, or the State. The extent, thereof, must meet the financial support which can be borne by motorists, as special users. Obviously a great many miles of purely local roads and streets, where no traffic problems exist, must be excluded from the system of critical needs.

Unquestionably, proper adjustment of land use in the submarginal land areas of the region will bring about the abandonment of many miles of unneeded and costly local roads.

It is on these heavily traveled rural routes and urban arteries that the essential highway transportation movement takes place. It is there that expenditure of the revenues from motor-vehicle taxes will for the most part be made under a just and rational highway plan. It is a mistake to believe that such concentration of effort on a strategically selected system rather than spreading it over total road mileage results in any hardship to traffic. In the one case actual highway benefits are widely and highly utilized; in the other, highway utilization may be just as great, but the benefits are of a much lower order.

The paper points out that more than half of suburban fatal accidents occur within 5 miles of cities and that 28 percent of all such accidents occurred within 1 mile of cities. It is also evident that the divided-lane highway produces the minimum number of accidents.

Without forgetting the very real needs of much of the trunk-line and secondary mileage of the country, it is evident that inadequacy is greatest in the larger urban centers and radiates in diminishing intensity from them. Numerous indices prove it. In these areas where car ownership and heaviest traffic volumes are concentrated, are found the highest fatal accident rates and the gradual deterioration of business activity and property values in certain sections where transportation service is deficient.

The enormous proportions of the movement of vehicles on the principal urban arteries, the importance of this movement to the life of the city, and the blocking effect which occurs at intersections all indicate that special facilities must be built to handle it. Widening operations give relief but the relief is only temporary and in time the easier access to already crowded districts increases the basic difficulty. Unquestionably the only real solution will be found in the construction of depressed or elevated limited access streets to, through, and around the sections of highest commercial and traffic importance.

These modern arteries will traverse areas which urban growth and lagging transportation service have blighted. Such areas exist in every great metropolitan center, and the development of broad adequate channels for traffic will not only correct the faults that created them, but will be a powerful influence in restoring them to usefulness and prosperity.

A recent traffic survey of Detroit disclosed that these blighted areas contain certain districts in which are concentrated the car owners most often involved in accidents. Thus it may be expected that in addition to providing facilities needed for safe driving, the development of these efficient streets will remove some of the conditions which produce bad drivers.

The Bureau of Public Roads report on Toll Roads and Free Roads, dated April 27, 1939, includes a national master plan for highway development. The plan for the region must include as an essential element decisions as to the principal superhighways needed for inter-regional traffic and movement within the region. This is a responsibility of the State highway departments. The State planning boards should give close consideration to the pattern of highways as they relate to and serve the industrial pattern of the region. It is important that the separate State plans be coordinated in this manner for the entire region.

Navigation

Water transport is a vital element in the industrial economy of the region. The system of locks and dams to maintain a minimum depth of 9 feet for navigation on the Ohio and its tributaries is complete and, except for maintenance, requires no development. On the Mississippi, the Corps of Engineers' plan contemplates reconstruction of and combinations of certain locks and dams, additional upper watershed reservoirs to insure minimum depths of pools during low-water periods and construction of a new channel at Chain-of-Rocks near St. Louis to relieve the bottleneck at that point. On the Great Lakes, 18- to 21-foot harbor depths have been completed at most important harbors and are contemplated at others. The strategic location of this region with respect not only to domestic population, but also as a safe place for industry, demands the early completion of the St. Lawrence canal to permit the navigation of ocean commerce to Great Lakes ports. Upon the completion of the St. Lawrence waterway, a large proportion of the ships in foreign trade may enter the Lakes harbors. This project should have high priority.

Also high in priority is the plan for completing the Indiana-Illinois waterway connecting Lake Michigan with the Illinois River, the Mississippi, and the Gulf of Mexico. This canal includes the provision of a channel 9 feet deep and 160 feet wide from Indiana Harbor and Lake Calumet through the Sag Channel to the Illinois waterway, and a deep-draft channel from South Chicago to Lake Calumet, where an interchange ship barge terminal will be built.

Air

The national airport plans of the Civil Aeronautics Administration provide a network of first, second, and third priority air routes and necessary airports. Wisconsin and Michigan have prepared State airport plans,

and the other States are giving attention to this problem. The State planning boards, in cooperation with State air authorities, should complete State airport plans at once. Aside from the provision of airports as part of a construction program, the primary need in the region seems to be the establishment of feeder routes so that air-traffic facilities may eventually be available to all communities.

The chairman of the State planning boards, acting as a regional committee, should give continuous attention to the transportation essentials of the region and thus perceive the means of coordinating transport not only within its own framework but also with industrial development.

Coordination of Transport Facilities

In line with national recommendations for the use of transportation facilities of all types, a regional plan of transportation coordination should be considered, particularly in its relation to the industrial pattern.

Personnel

The training and equipping of people is the backbone of the industrial economy of the region. While it is recognized that much needs to be done in developing the skills of people, there has been no coordinated plan directed to this end. During the past summer, 428 young men have been trained in Indiana under direction of the Work Projects Administration in cooperation with the State Department of Education, and at least 10 percent of them have already been absorbed in industry. Unquestionably, industrial operators prefer to train their personnel in their own plants, but rapid expansion of industry may require outside training. Certainly, the industrial pattern must include a well worked out program of personnel training agreed upon by planning, industrial, educational, and labor authorities. The schools and facilities for training exist. The coordinated program and organization for carrying it out is yet to be worked out.

Housing

There are no recognized State housing plans, and consequently, no regional housing plan in this region. Housing has been regarded as a local function, and while there are State housing authorities in all of the States of the region, they have not developed statements of housing needs from State or area viewpoint. There has been increased activity in home construction all over the region, most of which has been financed by mortgages guaranteed by the Federal Housing Administration. Most of this has not proceeded in accordance with area or municipal plans. The industrial pattern of the region, based upon State industrial plans, must

necessarily include a housing pattern, and should be developed by the associated State planning boards.

Municipal Planning and Government

The urbanized character of the region points to the necessity for continuous urban planning. It would be gratifying if it were possible to say that the municipalities of the region were seriously endeavoring to plan for their future development in a comprehensive manner. There are, however, only a few instances that may be cited as exemplary. Constantly rising local tax rates, accompanied by increased tax delinquency, are causing a rapidly growing recognition by citizens that cities must control their growth and have better government. This realization, accompanied by participation in civic affairs, will be a large factor in better local government and planning.

The critical areas in cities are the central areas and older residential districts surrounding the central business districts and the suburban fringe in which most new developments are taking place. Serious tax delinquency has developed in the central districts due to deterioration of buildings, crowding of population, congestion of traffic, and consequent movement of residents and business to outlying areas. In the suburban fringes, subdivision of land into building lots has far exceeded demands and needs, and has resulted in critical tax delinquency. The report of the Michigan Planning Commission entitled "A Study of Subdivision Development in the Detroit Metropolitan Area" reveals the serious situation which exists in that area. Similar situations, varying in degree, exist in many other urban centers of the region. This problem is national in scope, and the development of formulas for the control of development in the suburban fringe areas has been recognized as a subject for study by the National Resources Planning Board, through its land committee. Into this effort should be drawn the State planning boards and the county land-use planning committees, as well as city and county planning commissions. Methods of rehabilitating the central districts of cities should be attacked in a similar manner, and here as in the case of the problems of the suburban fringe, the cooperation of local committees of real estate, loan, and civic organizations should be sought.

In this region the solution of municipal planning problems and the guidance of future urban expansion are especially important for two reasons. The quality of municipal development now vitally affects the lives of more than 18,000,000 inhabitants of the region, and the cost of city government has a direct influence upon the income of these people. Good government and good planning of cities go hand in hand. In the second place, it is recognized by industrialists that the best place for the location of industry is in the well-planned

and well-governed city. In such locations, industrial operations may be carried on with the fewest handicaps to efficient operation and with the lowest taxes consistent with good government. In this region, where the main hope of the future rests upon continued industrial development, the good planning and good government of cities become a goal of first magnitude.

Conclusions

The development of this region, toward which adherence to the policies discussed hereinbefore will contribute, is dependent upon thorough cooperation between Federal, State, and local authorities and influential individuals. It is recognized that the threefold attack composed of basic research, education, and extension participated in by local people, has the potential ability to bring about the essential development of the region, but it is also evident that the process of development will be one of evolution commensurate with the growth of understanding among the people of the region of the necessities for development.

Federal agencies must recognize one outstanding fact, which is that, regardless of where research is carried on or where educational policies and processes are developed, the facts must be brought to localities and their people by established State official and semipublic educational and extension services. The educational efforts must be unified through the accepted State agencies.

The foregoing policies will provide a framework to which Federal, State, and local public works projects may be referred. Determinations of the soundness of projects may then be made with assurance that they will be logical elements of a unified plan of development. The State planning boards in each State of the region, with the aid of competent staffs, should act as the agencies that would bring to bear upon each proposed public works project the intelligent consideration of interested officials and individuals. The success of this method of current attention to details in the light of fundamental development policies has been demonstrated sufficiently to prove its worth.



**PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
SOUTH CENTRAL: REGION 5, DALLAS, TEX., 1940**

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Report of the South Central Regional Planning Office

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FOREWORD

The regional development plan for the south-central region represents the first known attempt to prepare a comprehensive word picture of the physical characteristics, resources, problems, future needs, and possibilities within the entire area. Obviously, such an undertaking has necessitated the assembling of much data and many proposals from numerous sources, particularly the State and Federal agencies.

It has long been realized, of course, that many individuals and agencies have been making important investigations and plans relating to the development of the region and that there was need for more effective cooperation in order to facilitate the activities of each agency and insure proper coordination of their respective programs. Accordingly, a permanent unofficial Regional Planning Advisory Committee was established to fulfill this need and to cooperate with the Dallas regional office, not only in the immediate task of preparing the first draft of the regional development plan, but more particularly for the purpose of cooperating in the further study and development of the plan that is to follow. It is contemplated that within the full committee, which is comprised of members from both State and Federal agencies, subcommittees will be appointed to facilitate future study and planning operations.

Although a considerable amount of essential information is now available for the planning of the area, it is clearly evident that this represents only a small portion of that required before complete plans and final recommendations can be made for the orderly and economic building of the region. Consequently, the regional development plan as presented herein must be regarded only as the foundation or framework upon which may be constructed gradually the comprehensive detailed plan so glaringly needed as an intelligent guide for future regional development.

The preparation of such a plan is no mean task, and the degree of success eventually achieved will depend almost wholly upon the sustained interest and cooperation of such individuals and agencies as those represented in the membership of the Regional Planning Advisory Committee. In the light of the invaluable services already rendered and the splendid spirit of cooperation manifested by the members of the Regional Planning Advisory Committee at its first meeting on September 23-24, 1940, there is every reason to believe that such cooperation in the south-central region will not only continue but will grow in its effectiveness. Moreover, it is believed that through this

medium, the regional development plan can and will be made a sound and useful instrument for evaluating public works programs and enhancing the social and economic welfare of the region.

Members of the Regional Planning Advisory Committee who assisted in drafting this report are—

L. A. Henry, director, Arkansas State Planning Board.

George C. Branner, Arkansas State geologist.

Sam S. Mims, representing DeWitt L. Pyburn, chairman, Louisiana State Planning Commission.

Ernest E. Scholl, chairman, Oklahoma State Agricultural Land Use Planning Committee.

C. S. Clark, chairman, Texas Board of Water Engineers.

W. E. Morgan, extension service, Texas Agricultural and Mining College.

Print Hudson, in charge, flood control surveys, Bureau of Agricultural Economics, region 6.

James W. Browning, in charge, flood control surveys, Bureau of Agricultural Economics, region 9.

Morris Evans, in charge, flood control surveys, Bureau of Agricultural Economics, region 2.

C. O. Henderson, area leader, Division of Land Economics, Bureau of Agricultural Economics, southeastern area.

Karl A. Shafer, representing T. G. Standing, leader, Division of Farm Population and Rural Welfare, Bureau of Agricultural Economics, area 6.

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T. Roy Reid, director, Farm Security Administration, region 6.

C. M. Evans, director, Farm Security Administration, region 8.

R. B. Baxter, representing Wilson Cowen, acting director, Farm Security Administration, region 12.

I. F. Eldredge, representing E. L. Demmon, Southern Forest Experiment Station.

Dwight P. Reardon, representing W. R. Parkhill, chief, Engineering Section, Farm Credit Administration.

Edwin R. Henson, coordinator, United States Department of Agriculture, southern Great Plains.

P. L. Sharkey, representing A. N. Thompson, engineer, Bureau of Reclamation.

E. C. Sullivan, district engineer, United States Public Health Service.

J. L. Lytel, representing Lawrence M. Lawson, commissioner, International Boundary Commission.

L. C. Fuller, representing M. F. Christiansen, assistant regional director, National Park Service.

F. R. Oliver, representing J. A. Elliott, district engineer, Public Roads Administration.

L. C. Elliott, regional manager, Civil Aeronautics Administration.

Col. F. S. Besson, district engineer, Corps of Engineers, Galveston district.

Maj. W. W. Wanamaker, assistant division engineer, Corps of Engineers, southwestern division.

Capt. W. H. Hastings, representing Maj. Samuel D. Sturgis, acting district engineer, Corps of Engineers, Vicksburg district.

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C. E. Ellsworth, district engineer, United States Geological Survey, Austin, Tex.

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George E. Barclay, representing John C. Gatlin, director, Fish and Wildlife Service, region 2.

Roy Moore, assistant regional director, United States Fish and Wildlife Service, region 4.

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J. R. Cobb, representing C. O. Falkenwald, director, Division of Cooperative Relations, Rural Electrification Administration.

SUMMARY OF THE REGIONAL PLAN

The regional development plan for the south-central region is predicated upon a realization that the population will grow, primarily through natural increase, about 20 percent in the next 20 years. In general, the plan would provide for:

Distribution of the people on the land according to its capacity to support them, where they will have a reasonable chance of success. This will result in—

(a) A relatively dense population within the alluvial valleys of the Mississippi, Red, Arkansas, and other rivers and their tributaries, in the irrigated areas within the subhumid regions, and in the central farm belt through Texas and Oklahoma;

(b) A minimum permanent population in the Ozark-Ouachita mountains, western range lands, trans-Pecos country, tidal marshlands, and to a less extent the piney woods region; concentration of this limited population within farming, trading, or manufacturing communities where they can be served conveniently and economically with all modern facilities.

This implies that the lands will be put to their most logical uses, such as cropping, forestry, grazing, and recreation.

Retirement from cultivation of all lands now in farms that are seriously eroded or are submarginal for agriculture, and reclamation of such lands for forest, pasture, wildlife, or recreational use.

Further agricultural development of those lands that can support additional population, based on scientific analysis to determine the proper load for these lands in order to accommodate people now located in submarginal areas. This will include the rehabilitation and extension of drainage systems, clearing of additional areas, and construction of irrigation systems.

Stabilization of farming on a sound basis by readjusting farm sizes, adopting carefully prepared farm plans, and utilizing proper farm-management practices.

Elimination of the unwholesome aspects of farm tenancy by assisting those to become owners who desire it, and by improving tenant-owner relationships for the remainder.

Reduction of land-tax delinquency by classifying and retaining submarginal tax-reverted land for public purposes and otherwise controlling it for its proper use.

Elimination of aimless farm migration by providing suitable opportunities for settlement on good land and giving proper guidance to such settlement.

Conservation of soil and water on all erodible land.

Restoration of the maximum carrying capacity and proper management of all permanent pastures and ranges.

Development of the full productive capacity of all permanent forest lands and promotion of an efficient forest-products industry that will consume the full sustained yield of the forests.

Protection of live and property from floods by means of coordinated systems of reservoirs, floodways, levees, and other water-retention devices.

Reduction of the effects of drought through the conservation of water in place, development of farm and ranch water facilities, and conservation and wise development of surface and underground waters for irrigation wherever practicable.

Protection of public waters against pollution by municipal and industrial wastes.

Insurance of established irrigation projects along the Rio Grande against loss of an adequate dependable water supply by securing necessary control of such water.

Conservation of energy resources by developing the fullest possible use of wasted natural gas and water power, in lieu of other fuels.

Construction of an adequate system of regional super-highways and freeways serving principal cities, military centers, recreational areas, and other main traffic objectives, with grade separations and other features for traffic speed and safety.

A full system of regional airways and seaplane facilities to serve primary civil, commercial, and military needs, with adequate terminal airports and intermediate fields, lighting, radio, and weather-reporting facilities.

A better-organized system of railroad facilities through consolidation of local lines into unified systems, orderly elimination of uneconomical duplications and branches, and full coordination with other types of carriers.

Development of all navigable waterways wherever such development can be justified economically.

Equitable freight rates.

A more logical industrialization predicated upon available raw materials, energy resources, and other important factors.

Modern, accessible public educational facilities for all the people, including libraries, laboratories, and provisions for vocational training in industrial skills.

Good public health through the establishment of

adequate hospitals and clinics, the control of mosquitoes and rodents, the enforcement of complete rural and urban sanitation, and the provision of balanced diets for all farm families through an increase in the production of green vegetables, milk, butter, and eggs.

Housing of at least a decent minimum standard for all the people, with good water, proper sanitation, and necessary modern conveniences.

Good local roads, rural electrification, social and welfare institutions, and other utilities and facilities for all areas that are suitable for permanent habitation.

Full utilization of the region's unusual recreational

opportunities, with attractive parkways to connect the more important recreational areas such as the Gulf coast beaches, mountains, State and national parks, and forests.

Maximum enjoyment of the wildlife resources for commerce and sport, through adequate and properly distributed conservation facilities.

Sufficient incomes to enable all the people to maintain a decent standard of living, made possible through greater industrial employment, increased and stabilized farm incomes, and development of supplemental incomes.

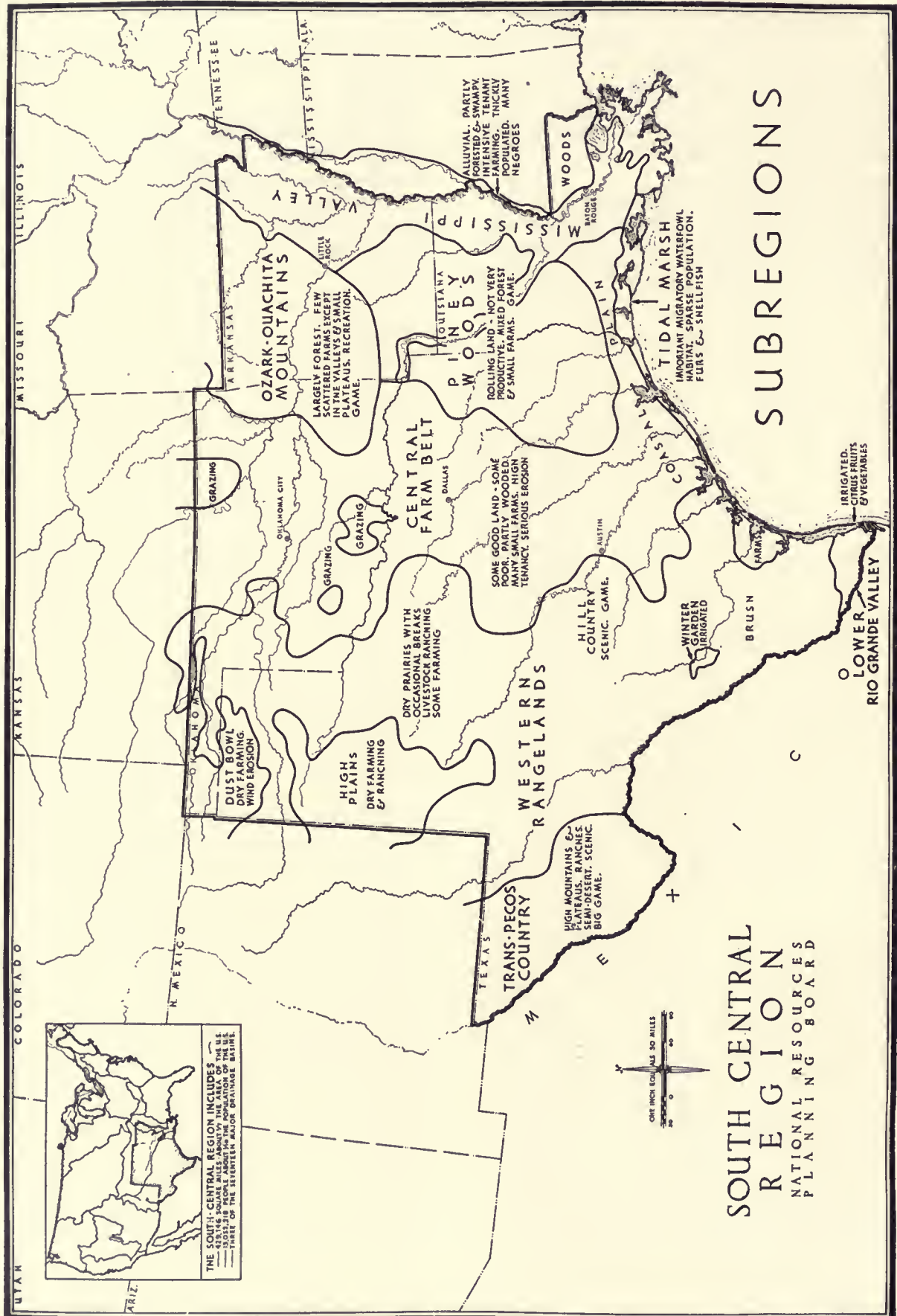


Figure 1.—Subregions of the South Central Region

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

SOUTH CENTRAL

The Region—Its Characteristics and Resources

Physical Characteristics

The south-central region includes the four States of Arkansas, Louisiana, Oklahoma, and Texas. Within this area there are nearly 430,000 square miles, or approximately one-seventh of the land area of the United States. It is seven times as large as all of New England, but contains only one and a half times the population. Of the total area, Texas comprises about 61 percent, Oklahoma 16, Arkansas 12, and Louisiana 11.

From the Gulf of Mexico on the south and the Mississippi River on the east, the land rises gradually westward almost to the Continental Divide, where it reaches a mile or more in height. Most of the area is composed of flat to rolling plains with rough outcroppings and hilly areas in certain localities. In the northeast portion, the Ozark-Ouachita uplift has created an extensive area of moderately high mountains, while in the far western part of Texas there are extensions of the Rocky Mountain system reaching 8,000 feet or more in elevation. There are many fertile valleys in the region, chief among which are the broad Mississippi River Valley along the eastern edge, and the Arkansas and Red River Valleys, tributary thereto. Numerous long rivers traverse the region, generally from northwest to southeast, and empty finally into the Gulf of Mexico. The more important streams are the Mississippi River along the eastern border and its southwestern tributaries such as the White, Arkansas, Canadian, and Red; the Trinity, Brazos, and Colorado, of Texas; and the Rio Grande along the southern border between Texas and Mexico.

The region is subject to a variety of climate, ranging from humid to arid and from freezing to semitropical. Almost the entire eastern half is humid, with an average annual rainfall of as much as 50 inches or more in some parts, while average rainfall in the arid sections is as little as 10 inches or less a year in the western extremity of Texas. One of the chief climatic difficulties of the region is the lack of uniform rainfall, causing droughts which sometimes recur several years in succession. Deviations up to 30 percent or more from the average annual precipitation are common. Such deviations are serious where the average rainfall is 30 inches or less, and farming habits can be adjusted with difficulty to such conditions. Moreover, serious

droughts are not uncommon even in the humid part of the region.

Influenced by warm winds from the Gulf of Mexico, most of the area enjoys a temperate climate with relatively high summer and moderate winter temperatures. In the high plains of northwest Texas and Oklahoma, there are often severe and rapid changes in temperature during the winter, at which times blizzards frequently occur that provide moisture for the growing of winter wheat and other crops. High winds constitute an additional problem in this locality, inasmuch as they create severe dust storms by removing the top soil from unprotected lands. The average wind velocity in the northwest corners of Oklahoma and Texas is twice as great as in the eastern parts of these States.

In the southern part of Texas, a semitropical climate prevails, which is conducive to the year-round growth of citrus and vegetable crops. Killing frosts are rare in this locality, while in the balance of the region the average growing season varies from about 280 days per year in southern Louisiana to 170 days in northern Arkansas and Oklahoma.

Within the region there are many types of land, ranging from cypress swamps to salty deserts. Heavily forested areas, agricultural plains, and grazing prairies are the most common.

Early Settlement and Growth

Although the first explorations in the south-central region were made about 400 years ago, actual settlement on any important scale has occurred only in the last 150 years. Many present-day problems are a direct effect of the time and methods of settlement in various parts of the region.

The earliest settlements took place quite naturally along the Mississippi and other navigable rivers, where large plantations were established with the aid of slavery. For a hundred years or more, much of the land in Louisiana and Arkansas has been intensively cultivated for cotton and sugarcane, until today a great part of it has been depleted in fertility to the point where considerable abandonment has already taken place. Now, there is a marked prevalence of substandard living conditions, of a lack of education and sanitation in this area; and numerous other problems are present.

Farther west in Texas, the settlement of land took place gradually, thus affording the settlers an oppor-

tunity to adjust themselves fairly well to the land. As a consequence, there are on the whole somewhat fewer problems from settlement in Texas than in the remainder of the region.

In contrast to Texas, the settlement of Oklahoma was sudden and destructive. Inasmuch as the Oklahoma Territory had been set aside for Indian purposes, no white settlement was permitted until nearly 1890. By that time, nearly all the adjoining States had been fully settled, and the pressure upon the gateways into Oklahoma became so strong that Congress finally began to open the Territory for settlement. In 1889, the first opening took place, and others followed within the next few years. Thousands of people rushed in overnight and seized the first land they could find, with the result that there was no chance whatever for them to distinguish the good land from the bad or to adjust the size of their holdings to the land capabilities. Today, we find that much land is overcrowded, farm incomes are low, housing is poor, and relief loads high. The land resources have been wasted by inexperienced handling and erosion, and distressed victims of this unwise settlement continue to migrate elsewhere in search of new opportunities.

Louisiana became a State in 1812, with Arkansas following in 1836. Texas, originally a part of Mexico, won its independence in 1836, and joined the Union in 1845. Oklahoma, because of its delayed settlement, did not become a State until 1907 and was the forty-sixth State to be admitted to the Union.

Present Population

According to the preliminary figures of the 1940 census, the region has approximately one-tenth of the Nation's population, or slightly more than 13 million. Nearly 2 million are in Arkansas, 2½ million each in Louisiana and Oklahoma, and nearly 6½ million in Texas. Spread thinly over a vast area, the population density averages about 30 per square mile.

The great majority of these people live in the eastern part of the region, where rainfall is adequate for most human needs. In this area, rural population densities of 20 to 90 persons per square mile may generally be found, while on the land farthest west, the density is frequently less than 2 inhabitants per square mile. Most of the larger urban population centers are also located in the central and eastern sections.

In 1930, nearly two-thirds of the people lived in rural areas and one-third in cities and towns of 2,500 or more. Nearly one-fifth of the people in the region are Negroes, and there are also nearly 700,000 Mexicans. Most of the Negroes live in Texas, Louisiana, and Arkansas. In many counties of the latter two States the proportion of Negroes reaches 50 percent or more. Approximately 37 percent of the population of the

State of Louisiana is Negro. Most of the Mexicans, on the other hand, are in southern Texas, where they constitute a high percentage of local populations in many places.

The population of the south-central region is somewhat "younger" than that of the United States as a whole. In 1930, less than 39 percent of all the people in the United States were under 20 years of age and 5.4 percent were over 65, while in the south-central region about 44 percent were under 20, and only 4 percent over 65. There are at least two reasons for this, one being the higher birth rates in the South, which tend to increase the percentage of young people, and the other being the comparatively recent period of settlement in Oklahoma, during which time it appears that great numbers of young people moved into the State leaving the older people behind.

About 37 percent of all the people in the region are considered gainful workers. Of these, about 40 percent are normally engaged in agriculture; 17 percent in manufacturing and mechanical industries; 16 percent in professional, personal, and domestic service; 11 percent in wholesale and retail trade; 7 percent in transportation; 5 percent in clerical pursuits, 2 percent in production of minerals; 1 percent in miscellaneous public service; and 1 percent in forestry and fishing.

These figures indicate higher percentages of persons skilled in agriculture and lower percentages skilled in industry than for the Nation as a whole. Lack of skilled workers will be a handicap to further industrialization unless there is a concerted effort to train more people in industrial pursuits. Higher percentages of professionally and technically trained persons would help to promote business enterprise and greater prosperity for the region by reducing somewhat the emphasis on agriculture.

While the entire region has steadily grown throughout past decades, there has been a significant difference in the rates and trends of growth as between the several States. Arkansas and Louisiana, for instance, have had a normal steady growth at about the same rate as the United States in general, although the percentage of increase in the decade just completed was somewhat less in both States than in previous decades. In the last ten years, Arkansas increased 5.1 percent and Louisiana 12.1 percent. Texas has grown more rapidly in the past than either Arkansas or Louisiana, but now appears to have settled down to a rate of growth paralleling that in Louisiana. Its increase in the last 10 years was 10.2 percent. Oklahoma, which experienced a rapid surge of growth from 1890 to 1910, grew with increasing slowness from 1910 to 1930, and suffered an actual population loss of 2.81 percent in the last decade. Apparently, Oklahoma is now going through a period of readjustment as a natural reaction from the rapid

and often unwise initial development, especially in the Great Plains area.

During the 1930-40 decade, the region grew at almost the same rate as the United States as a whole, the rate for the United States being 7.0 percent, and that for the region 7.2 percent; however, the growth is not uniform throughout the region, but is occurring mainly in Louisiana and Texas.

The two sources of population growth are natural increase and migration. In the South-Central region, the vital statistic records show that from 1930 to 1940 there were 2,384,515 births and 1,226,745 deaths, making a net increase of 1,157,770 within the decade. Inasmuch as the 1940 census reported an increase of only 875,388, it is obvious that the region must have lost more than 282,000 people through migration. Practically all this loss occurred in Oklahoma, while the remainder was lost from Arkansas.

Both Louisiana and Texas gained slightly through migration. Louisiana's total gain of 12.1 percent for the decade was made up of 2.6 percent from migration and 9.5 percent from natural increase. In Texas there was a natural increase of 9 percent and an additional 1.2 percent increase through migration. Oklahoma would have gained 10 percent through natural increase if it had not lost over 300,000 people through migration to other States in and out of the region; and, similarly, Arkansas would have gained 10.3 percent through natural increase if it had not lost about 98,000 through migration. Altogether, there would have been an increase for the entire region of 9.2 percent if there had been no loss through migration, as against the 7.2 increase that actually occurred.

Migration within the region has resulted in considerable local variations as to population gains and losses. Only 57 percent of the 470 counties in the four States showed an increase in population during the last decade, whereas the remaining 43 percent lost population. In Oklahoma, gains were recorded in only 38 percent of the counties, but Louisiana gained in 88 percent. These gains and losses reflect the serious problems that exist in many agricultural areas. The instability of population is in itself a serious problem because a large migratory population does not contribute to the building up of healthy social conditions within an area. This problem of population losses has not affected the cities to the extent that it has the rural areas. Only 10 of the 81 cities in the region having populations of 10,000 or over in 1940 suffered population losses. It appears, therefore, that with few exceptions, the cities will continue to grow, even though at a slower rate.

Natural Resources

Land.—Of the 275,000,000 acres of land within the south-central region, approximately 65,000,000 acres,

or 24 percent, were under cultivation in 1934. The principal croplands are in the alluvial valley of the Mississippi River, along the coastal plains, and throughout a great part of the central and western plains of Oklahoma and Texas. The agricultural land is characterized by a wide diversity of soil, topography, and native cover.

There is a great variety of crops grown, including cotton, sugarcane, rice, wheat, sorghum, and numerous others. Through the central part of the region, there is general farming, and in many localities there are specialty crops, such as yams and roses in east Texas; fruits, berries, and melons in Arkansas, Oklahoma, and Louisiana; and citrus fruits and vegetables at various points along the Gulf coast, especially in the lower Rio Grande Valley. Cotton is one of the major crops of the region, amounting to about 47 percent of the Nation's total production annually.

Originally, most of the eastern half of the region was covered with forests of various types, and much of this area may still be classified as more suitable for forests than for any other major use. According to the Forest Service, there are some 52,000,000 acres of commercial forest lands in the region. This forest area comprises about 62 percent of the total area of Arkansas, 56 percent of Louisiana, 10 percent of Oklahoma, and 6 percent of Texas. Lumbering has been an important activity in the region since 1900 or before, and in 1937 it accounted for about 14 percent of the Nation's total lumber production, with a value of about \$150,000,000.

Large sections of the region, mostly in south and west Texas and the Oklahoma Panhandle, together with two or three localities in southern Oklahoma, are ranch lands primarily, capable of supporting large herds of beef cattle and other livestock. This type of land can support only a limited population, inasmuch as efficient operating units require ranches of from 2,000 to 10,000 acres. Some ranches may be found of over 100,000 acres, the largest of which is the world-famous King Ranch in south Texas near the Gulf, which contains over a million acres. The land is characterized by level or rolling topography broken by escarpments, canyons, and other rough land, and by mountain ranges in the area west of the Pecos River.

In other parts of the region, especially in Osage County, Okla., there are natural pasture lands covered with long grasses and particularly adapted to the finishing of beef cattle for marketing. Still other areas in eastern Oklahoma and western Arkansas have a certain amount of pasture value in combination with forestry.

Almost the entire Gulf coast of Louisiana, extending 20 to 30 miles inland, and a narrower fringe along some portions of the Texas coast are tidal marshlands. Their major uses are for wildlife and grazing; however, oil, sulfur, and salt are produced in certain of them.

More land is used primarily for livestock pasturage in the south-central region than for any other purpose. The area so used is estimated to be 119,000,000 acres or 43 percent of the total land area. The amount of grazing land has been declining gradually through the years with the advance of crop farming, especially the large-scale wheat and grain sorghum farming in the northwest, and cotton farming farther south. In many instances, land has been farmed that was more suitable for grazing and should never have been plowed. Drought and wind erosion have resulted in much land abandonment and attendant problems. Restoration of the pasture grasses on such land is difficult once the original sod has been destroyed. In addition, much of the land that has remained in pasture has been consistently and severely overgrazed. Such practice results in the depreciation of the native pasture grasses due to their lowered resistance to drought and permits the intrusion of weeds, cactus, mesquite, scrub cedar, and other noxious plants.

A survey in 1935 indicated that the short-grass range in western Texas and Oklahoma had declined 50 to 75 percent from its original forage value. Continued overgrazing will steadily deplete the range resource and endanger the important livestock industry, which was the original industry in both Texas and Oklahoma, and which continues to represent a vital element in the economy of the region.

Relatively small portions of the land resources are occupied by urban development or used for industrial, mining, and recreational purposes, or for fishing, trapping, wildlife conservation, and similar public and private activities. The coastal marsh lands of Louisiana and southeast Texas are used extensively for commercial trapping and fishing, for recreational hunting, and for game conservation. The Ozark-Ouachita mountains are used extensively for recreation. Areas near the larger cities are occupied by industries and other semiurban development. Considerable areas are covered by oil and gas fields in various parts of the region, but this use is frequently intermingled with other uses such as agriculture or grazing. Mining activities also utilize small areas in eastern Oklahoma and parts of Arkansas and southern Louisiana.

Water.—Major streams within the south-central region are typical "through rivers" rising in the arid western section and flowing into the humid eastern area. These streams have dissimilar characteristics in their upper, middle, and lower sections, each of which presents distinctive water problems.

In the western half of the region, generally west of the ninety-eighth meridian, the water resources are limited by low rainfall. Surface waters are relatively scarce except immediately after the heavy rains that are likely to occur locally at any time, especially in the summer.

Intense storms of 16 to 22 inches precipitation over large areas in short periods of time are not unknown. Following such storms, the otherwise dry water courses become angry torrents, which subside quickly into dry stream beds. Some of the longer rivers, such as the Cimarron, Canadian, Rio Grande, and Pecos, have their headwaters in the mountains of New Mexico and Colorado, where precipitation is heavy, and although they may carry considerable water where they emerge from the mountains, there is an appreciable loss of volume as the streams flow through the middle reaches. Sections of other rivers such as the Red, Brazos, and Colorado, which originate in the arid high plains, and the Nueces, which originates in the Edwards Plateau, are virtually dry most of the year.

In the western half of the region, there is also a serious problem of water supply for all purposes, including irrigation, domestic, and municipal uses, stock water, flushing of wastes, and even dry farming and ranching. Moreover, people living in the valleys are subjected to severe losses and handicaps due to flash floods. Many sources of water supply present further problems due to mineralization, especially in portions of western Oklahoma and Texas, where such streams as the Salt Fork of the Arkansas, the North Fork of the Red, the Cimarron, and the Pecos acquire heavy loads of salt or gypsum in traversing natural mineral deposits.

Underground waters are generally adequate for existing local purposes and, in some instances, for limited supplemental irrigation, but these sources, too, are highly mineralized with gypsum salt, or fluorides in some localities. Large quantities of underground potable supplies are known to exist in some areas and have been developed for irrigation to a certain extent, but there is always the danger of misguided overdevelopment through lack of adequate factual data as to the amount and quality of water available and the cost of pumping.

In the eastern half of the region, the principal problem is an excess of water from floods, backwaters, marshes, and swamps. The construction of levees, which began early in the eighteenth century, is being carried on to protect the land further. Even in this area there are occasional severe low water flows in the major streams that interfere with water supplies, elimination of wastes, navigation, and fish life. Many local streams dwindle in the summer, resulting in a deficiency of water supplies and serious stream pollution.

In a large portion of the Ozark Mountain area of northern Arkansas, underground water supplies are generally plentiful. Many of the streams are fed the year around by numerous large springs, some of which are among the largest in the United States. These streams are considered excellent for fishing and recreational use. Underground waters are available also in

most parts of the Mississippi Valley, but in some instances, as in the Grande Prairie rice area of Arkansas, a serious problem may soon be created by overdevelopment if proper precaution is not taken. In the Mississippi River Valley country, there are many large and small lakes, lagoons, and bayous, which are valuable for fishing, waterfowl, and recreational uses. On the other hand, however, the presence of these water areas creates serious malaria problems.

In the upland areas of Arkansas, eastern Oklahoma, and central Texas, several of the rivers are so situated as to afford sites for the generation of water power, some of which have already been developed. The chain of power and flood-control reservoirs on the Colorado River in Texas is a notable example. Many streams in Arkansas, Louisiana, and Texas are suitable also for development of navigation. For many years, these streams afforded the only avenues of access to the newly opened country. At the present time, Louisiana has, perhaps, one of the most extensive systems of inland waterways in the country. Navigation, however, is not without its problems, which include the shoaling of channels due to severe soil erosion, silting of channels due to floods, and shallow depths due to low water at certain times of the year. Some streams, such as the Arkansas, were once navigated for considerable distances.

Drainage of agriculture lands is a serious problem, especially in the Mississippi Valley. Throughout this area, hundreds of independent drainage and levee districts have been created in the past, a considerable number of which are now in financial difficulties. As a result, many drainage facilities have not been completed, and there is a lack of proper coordination, maintenance, and operation.

While the water problems in the Mississippi Valley relate chiefly to protection against surplus waters and their disposal, in some localities there is a need also for storage against droughts and maintenance of existing rice-growing areas. Along the Gulf Coast, the intrusion of salt water into the mouths of the rivers and bayous has been interfering seriously with municipal supplies and with the irrigation of rice areas. The city water supply of New Orleans is affected at times by such salt water intrusion.

The central part of the region represents a blending of the water resources and problems of both arid and humid sections. The major problems here are due to fluctuating stream flows resulting from frequent extremes of flood and drought. Such variations contribute to the problem of pollution of both surface and underground waters by sewage and oil-field wastes. Pollution from mines, pulp mills, sugar mills, and various other forms of industries constitutes a serious problem in Oklahoma, Louisiana, and southeast Texas.

The lower Rio Grande Valley presents a special problem due to the uncontrolled flow of water in the Rio Grande and the total dependence of the area upon this water for its irrigation systems. New irrigation projects are now being developed on the Mexican side of the River that threaten to curtail the American supplies, and so far there has been no success in negotiating a satisfactory treaty with Mexico to overcome this difficulty. Meanwhile, large volumes of flood water flow into the Gulf of Mexico and are wasted, inasmuch as the necessary reservoirs to conserve this resource cannot be built on the main stream without an international agreement. The problem is to find some practical means of insuring an adequate and dependable water supply for the existing irrigated area on the United States' side of the River. Fortunately, steps have already been taken in this direction by the International Boundary Commission.

Minerals.—It is reported by the Bureau of Mines that about one-fourth of the Nation's total mineral production, based on value, comes from the south-central region. Texas leads the Nation, with Oklahoma ranking fourth, Louisiana sixth, and Arkansas thirty-first. The total value of mineral production from these States was over one and one-third billion dollars in 1937.

Although there are numerous important minerals to be found in the region in considerable quantities, the greatest wealth by far is in oil and gas resources. Some of the largest oil and gas deposits in the Nation, including such fields as the east Texas, Rodessa, Amarillo, and Midcontinent, occur within the south-central region. Texas ranks first among all the States in crude production, with Oklahoma third, Louisiana fourth, and Arkansas tenth. It has been estimated that the known oil reserves in the region are sufficient at the present rate of production to last about 16 years, and additional reserves are still being discovered. In Texas and Louisiana, at least, new discoveries exceed consumption.

It is estimated that the natural gas reserves in the Midcontinent and Gulf coast fields range from 47 to 51 trillion cubic feet, or about 50 percent of the total gas reserves of the United States. It is said that millions of dollars worth of natural gas are blown away into the air every day because the producing fields are so far away from the centers of consumption that the cost of transporting this gas places an economic limit upon its utilization. One of the outstanding problems of the region, therefore, is to develop means of utilizing this resource near its point of production other than for such uses as the production of carbon black. There are also other serious problems, including disposition of brines and oil wastes and the various social and economic difficulties arising from oil "boom towns" and their later deflation.

It is estimated that a little over 3 percent of the Nation's total coal reserves are in this region, large deposits being found in Texas and Oklahoma and lesser quantities in Arkansas. In addition, there are about 30,000,000,000 tons of lignite in Texas. Neither of these resources, however, is being produced in any great quantity due to the preference for oil and gas as fuels. They are, however, a most valuable resource to the region and the Nation in that they provide an important fuel reserve. There has been some coal production in previous years, especially in eastern Oklahoma, where the growth of several large communities, such as McAlester, has been based on a coal-mining economy. In these localities, serious problems, including stranded population, unemployment, high relief loads, and poor housing, have resulted from the decline in coal production.

Zinc and lead are found in large quantities in the northeast section of Oklahoma and to a smaller extent in Arkansas and Texas. In 1929 the Oklahoma deposits produced nearly 37 percent of the world's supply of zinc, but the output fluctuates widely in accordance with world conditions and market demands.

The only large deposits of bauxite (aluminum ore) in the United States are found in Arkansas, which produces over 95 percent of the bauxite originating in this country. Only 47 percent of the bauxite consumed in the Nation, however, comes from domestic sources. The remainder is imported.

Large quantities of sulfur are found in southern Louisiana and Texas along the Gulf coast. Texas, alone, produced over 2,000,000 tons valued at \$36,000,000 in 1937.

Helium, a rare, noninflammable gas used in lighter-than-air aircraft, is found in two or three parts of Texas, the principal deposit being near Amarillo. At the present time, this is the major source of supply in the world. The existing reserves and facilities for recovery are under the complete and strict control of the Federal Government.

Various quantities of other important minerals exist also throughout the region, such as iron, manganese, copper, gold, silver, tin, antimony, titanium, quicksilver, graphite, phosphates, salt, potash, gypsum, fuller's earth, rock asphalt, and many others. Large quantities of common building materials, such as limestone, marl, marble, granite, clay, sand, gravel, mica, and silica, are also found in the region. Several of these are utilized locally for building purposes. Further development of many of them will depend upon additional explorations, the advancement of technical knowledge necessary for efficient production and utilization, and the development of industries requiring these materials.

As a whole, the south-central region contains a tremendous wealth of mineral resources. Their prev-

alence affords opportunity for increased industrial development, of which there is great need in the region.

Wildlife.—Wildlife resources are of vast importance to this region. A recent report of the Forest Service placed the total annual value of such resources in Texas alone at more than \$94,000,000. This is more than three times the value of similar resources in any other State. Obviously, such resources have both a commercial and recreational value. The Gulf coast of Louisiana and Texas constitutes the most important migratory waterfowl winter headquarters in the Nation, and huge reservations have been established for their protection.

Louisiana ranks as the leading fur-producing State in the country. Fur-bearing animals of commercial value include muskrat, mink, raccoon, opossum, otter, badger, fox, civet cat, and skunk. There are approximately 12,000 trappers in Louisiana alone. Their activities give employment to some 30,000 persons. There has been a decline in the number of fur-bearing animals in recent years, said to be due to drought, disease, and storms. Remedial measures are needed to restore this important resource to a sustained-yield basis.

Commercial fishing is an important industry. Many shellfish are found in quantity, including oysters, shrimp, and crab, as well as a wide variety of other fish. The canning of shrimp and oysters employs many thousands of persons along the Gulf coast. The conservation of these resources has been undertaken by State agencies with some apparent success, but certain important problems still remain.

The recreational significance of wildlife in the region is also enormous but difficult to evaluate. Important reserves of small and large game, as well as game birds, are to be found in various parts of the region. Recreational fishing includes tarpon, swordfish, and shark, as well as a variety of smaller fish.

The Federal Government has established some of the world's largest wildlife sanctuaries in this region, including the Sabine Lake Migratory Waterfowl Refuge of nearly 140,000 acres in Louisiana and the White River Migratory Waterfowl Refuge of over 99,000 acres in Arkansas. A unique wildlife-research station of over 61,000 acres has been established in Oklahoma, where different varieties of western wildlife are being protected and studied. Altogether, the Federal game preserves in the region total more than 462,000 acres. In addition, there are large State preserves, especially in Louisiana, which have been made possible, in part, through private endowments, such as the Rockefeller Wildlife Sanctuary of 86,000 acres and the Russell Sage Sanctuary of more than 75,000 acres. Many other game preserves, wildlife refuges, and fish hatcheries are located throughout the region.

The entire region is well adapted to the propagation and preservation of wildlife on a large scale by reason of its favorable climate, vegetation, and topography. The principal needs are more and properly distributed preserves, reasonable regulations, and the inclusion of plans for wildlife in all land-management and resource-development programs.

The Regional Development Plan

Future Population

Because the development of the region should be in the interest of its population, it is important first to obtain some idea of the number and character of the population to be served before proceeding to plan. It is impossible, obviously, to predict accurately the population of the future, but a general indication of probable population increases can be gained from a study of past growth and trends, birth and death rates, and migration, together with an appraisal of the opportunities for further settlement within the area.

It appears obvious in the light of the declining birth rate and restrictions upon immigration that the population of the United States will eventually reach a maximum. It is estimated that the peak will be approximately 158,000,000 about 1980, after which the population will remain more or less static or will decline slowly. When this point is reached, the problem will not be one of locating new population, but rather of improving the general welfare by readjustment of existing population to the land.

The discussion in preceding sections has indicated that this region has large reserves of undeveloped resources, especially land and minerals, and that it can probably accommodate considerably more people than it now has. Estimates of future population growth indicate that this region may be expected to have a population of something more than 15,000,000 by 1960, if present trends as to births, deaths, immigration and migration continue substantially as they have in the past. Should there be any abrupt changes in any of these factors, the estimate for 1960 will vary accordingly. As an illustration, previous estimates for some of the Great Plains States have gone amiss during the last decade due to unanticipated droughts, economic conditions, and consequent migration.

Any long-range program for the region should anticipate a natural population increase of at least 20 percent by 1960, without regard to immigration. The question arises as to where these people, in the interest of their own welfare, should live and what the desirable population pattern of the region should be. Obviously, it is important to determine those localities that are most suited to future permanent settlement, and that the regional program provide for the logical development of those areas. It must be determined, for instance,

what maximum density of population could and should be accommodated on each type of land, such as crop, forest, and grazing.

Extensive studies have been made to determine the carrying capacity of western range lands in terms of head of cattle that can be permanently sustained on a given area of grazing land, but except for limited areas there has apparently been no determination, type by type, for the region as a whole, of the capacity of different types of agricultural land to sustain human habitation.

Until some scientific basis for population distribution is formulated, any predictions relative to such distribution within the region must necessarily be taken with reserve. In general, however, it appears that a relatively dense population may be expected in the agricultural portions of the Mississippi alluvial valley; in the coastal plains, where closer settlement may be expected as a result of further drainage improvements; in the central farm belt, excepting such portions as are unsuited to intensive agriculture; and in such areas as the lower Rio Grande Valley, where intensive development may be possible through irrigation, industrialization, mining, or oil-producing activities. A relatively sparse population must be expected in the following areas: The Ozark-Ouachita Mountains, where some reduction may be expected from the elimination of impractical hill farms; in the piney-woods area, where the population will be limited to that necessary to carry on forestry, forest products manufacturing, oil development, and a certain amount of combination farming in the more fertile areas; in the tidal marshes, which should be retained for large-scale game and fish conservation and management; in the western range lands, where extensive ranching predominates, and where such farms as are recommended will generally be quite large; and in the trans-Pecos country, which will remain primarily a ranching and recreational area.

Land Use Adjustments

Throughout many parts of the region there is much land in farms that is submarginal for agriculture or has been badly damaged by misuse or neglect. All such land should ultimately be retired from cultivation. In the hill lands of Arkansas and eastern Oklahoma, for example, there are isolated patches of cultivated land in farms which were never suited for that purpose and which have now lost most of their top soil. Prairie lands in the Dust Bowl area have been virtually destroyed through improper cultivation and loss of top soil by wind erosion. Within the central farm belt, many fields have been too intensively or improperly cultivated and have lost their fertility through erosion and gullying.

To correct these problems, the Federal Government

has purchased over 650,000 acres of such land in the region, which it has withdrawn from agricultural use and converted to grazing, forestry, recreation, wildlife protection, and other uses. Some of this land, however, is still in the acquisition stage. Through such purchases it has been possible to make land-use adjustments not only on the land acquired but also on adjacent farm land through coordinated grazing and forestry. The ultimate goal of the Federal Government is to purchase all lands in the region that cannot be adjusted to their proper use while remaining in private ownership. No estimate is available as to the total amount of such land to be acquired, inasmuch as acquisitions will depend upon detailed surveys and land-use plans in each locality.

There are certain parts of the region where the physical and economic factors of land misuse have resulted in a very low standard of living, and in which concentrated purchases are proposed. Among these are parts of northeastern Arkansas within the Ozark Mountains and along Crowleys Ridge; various parts of Oklahoma, such as the eastern portion of the central farm belt, portions of Garvin, Gradey, Caddo, McClain, and the western tier of counties, and also portions of the Panhandle that are unsuitable for cultivation; parts of Texas west of Fort Worth, from the Red River southerly to Brown and Mills Counties, parts of the southern high plains adjacent to New Mexico, a strip of upland adjoining the Rio Grande below El Paso, and several smaller areas. Within these areas, it is estimated that 10 percent or more of the land must be placed under Government ownership as one means of correcting present difficulties.

Other large areas are indicated in which scattered purchases are required, since maladjustments, instead of being concentrated, are dotted throughout the area. Among these are most of the Ouachita Mountain area in Arkansas and Oklahoma, the foothill and plateau areas of northeast Oklahoma and northwest Arkansas, the piney-woods sections of Arkansas, Louisiana, and Texas, and the cross-timber areas in Texas. Less than 10 percent, and in many cases only 1 or 2 percent, of these areas are recommended for purchase in order to bring about more desirable social and economic conditions.

While it is generally recognized that considerable land in certain areas must eventually be taken out of agriculture and restored to forest cover, no practical method has yet been devised for accomplishing this objective, inasmuch as the resulting problems of population resettlement and effect on local social and economic conditions have not been solved. One of the first questions that arises when land is proposed for purchase is where to relocate the displaced population.

There is immediate need of a survey of the entire

region to determine what lands are available that can support additional population and how many people such lands can support on a reasonable plane of living. Such information is urgently needed and must be obtained before any real progress can be made in readjusting land uses.

At least one study of this kind is now under way in the backwater area of the Yazoo River Delta in Mississippi, which, it is hoped, will be extended ultimately throughout all similar areas in the Mississippi alluvial valley. This study is designed to determine the most practical permanent use of lands now undeveloped because of frequent backwater flooding, but to be protected in the future by the comprehensive Mississippi River levee system now under construction. Such factors are covered as soil types, drainage problems, size and kind of farms, density of population, cost of improvement and maintenance, probable income, and resulting standards of living.

Other studies are needed to devise practicable economic readjustments in the areas to be depopulated.

Soil Conservation

It is estimated that of the 275,000,000 acres in the region, a complete coordinated soil- and water-conservation program is needed on some 190,000,000 acres, or 69 percent of the total acreage. Of this, 100,000,000 acres need immediate corrective treatment and 90,000,000 acres need preventive measures. The 85,000,000 acres regarded as requiring no conservation measures consist generally of the alluvial valleys, coastal plains, rocky mountains, forests, and other nonerosive lands.

The 4 States in the south-central region are among the leaders in soil conservation activities. With 31 other States, they have recently enacted legislation to permit the creation of local conservation districts in cooperation with the Soil Conservation Service and other Federal agencies. At present, there are about 160 local conservation districts organized, or being organized, in the region. Their scope embraces more than 117,000,000 acres.

The activities of existing districts should be intensified and additional districts organized for the expansion of the conservation program. Usually, these activities embrace contour plowing, terracing, strip cropping, forestation, and other appropriate measures including the inauguration and enforcement of local regulations pertinent to conservation—all of which are of paramount importance to the vital agricultural economy of the region.

Forests

Nearly 20 percent of the total area of the region is in commercial forests. If this forest area was brought up to production capacity and forest industries augmented

to maintain pace with increased timber production, at least part-time employment could be found for a large portion of the present unemployed and distressed rural people. In east Texas, some persons with foresight are acutely conscious of the fact that within the next quarter century their oil fields, which are now their chief source of wealth and employment, may have gone the way of all nonreplaceable resources. They realize that of all their remaining resources only their timber land, properly managed and brought to full production, promises to maintain the prosperity to which they have become accustomed. The same thing may be said of Arkansas and Louisiana. In Oklahoma and Texas, there is a marked shortage of land in commercial forests, and the expense of importing lumber and other essential wood commodities from distant sources may eventually have a serious effect upon the continued settlement and development of the vast acreage of open country. Hence, the economic necessity of developing the present growing stock of timber to the full capacity of the land it occupies is quite evident.

The long-range objectives for the region should be (a) to retain in forest cover substantially all the area now in commercial and noncommercial forests, and to build up the growing stock of timber in both volume and quality to the full productive capacity of the land, (b) to develop forest-products industries to a degree whereby such industries will consume efficiently the full sustained-yield capacity of the forest lands. The achievement of these two objectives will throw the full weight of this important resource into the elevation of the plane of living for millions of people.

The more immediate objectives should be (a) to reduce the tremendous economic losses occasioned by forest fires, insects, and blight, (b) to curtail wanton or ignorant exploitation and to substitute thrifty, foresighted, and technically sound forest management, (c) to get down to cases in broadening and extending local cash markets for timber now standing idle, wasted, or left in the woods to rot in tremendous quantities, (d) to increase materially the area of forest land in public ownership, both Federal and State, in order to afford adequate protection and to serve as demonstrations of good forest management, (e) to provide some source of low-rate, long-term credit for forest owners needing financial assistance, and (f) to carry on forest research intensively throughout both the commercial and noncommercial forests, that owners and managers may have a sound technical basis upon which to proceed, confident of success.

Eight important steps are necessary to the gradual accomplishment of these objectives:

1. Increase the Clarke-McNary Federal appropriation for cooperative fire protection for the States of the region from the present \$178,000 to \$1,200,000, with

the continued requirement that the sum be matched by the States and private owners.

2. Enact Federal laws that will aid and encourage each of the four States to pass and put into effect reasonably uniform legislation designed (a) to require compulsory State-wide fire protection by all forest owners, costs to be matched with public funds, (b) to prevent the clearing of forest lands (except for agricultural use in officially approved agricultural zones) and the exploitation of timber stands in a manner that will result in serious forest depreciation, (c) to require a gradually increasing degree of good forest practice to build up the resource, and (d) to remove such obstacles to stabilized long-time land ownership and industrial development as may exist in present laws, including those relating to taxation.

3. Strengthen and expand the State forest services to the full extent necessary adequately to lead, educate, and, if necessary, regulate forest owners and the forest industries in the protection and sound management of their forest properties, as well as to administer an expanded State forest system.

4. Acquire as State forests, under the Fulmer Act, approximately 600,000 acres of forest land, to be of such character and so located as to serve forest owners as demonstrations of first-class forestry. (The area at present in State forests is 26,000 acres.)

5. Expand the present national forests in the four States and establish new national forests to the extent of an additional 6,000,000 acres. (The present area in national forests is 3,358,000.) As conceived by the regional office of the Forest Service, the cost of acquisition of new State forests under the Fulmer Act would approximate \$2,700,000, and of the additional national forests, about \$46,000,000.

6. Add to the agricultural extension services in the several States a greatly increased corps of forestry specialists, whose function it would be to deal directly as consultants with the general run of small timber owners. The ideal situation would be to have one such forester in each county in which forestry is a major problem or a major industry.

7. Ascertain by careful investigation the kind, number, size, and location of forest industries that the forest resources can and should support. This action might logically be made part of a general industrial program for the region.

8. Research work in silviculture, forest management, forest economics, protection, forest influences, and flood control should be greatly increased, intensified, and accelerated. As a part of this work, the Forest Survey of the South should complete its field inventory of Arkansas, Oklahoma, and Texas, in which over 30,000,000 acres are as yet unsurveyed.

Farm Tenancy

The social and economic aspects of farm tenancy, together with recommended action programs, are set forth in a comprehensive study and report on Farm Tenancy, published in February 1937, by a special committee appointed by the President. Among other things, the report indicates there had been an annual national increase of about 40,000 new tenants during the preceding 10 years, and that in the spring of 1935, more than a third of the 2,865,000 tenant farmers in the Nation had occupied their present farms only 1 year.

The problems of farm tenancy are extensive and pronounced in the south-central region. Remedial measures must be found if the future welfare of a sizeable portion of the rural population is to be enhanced. There are approximately 620,000 tenant farmers in the south-central region, 200,000 of whom, with proper financial assistance, could become farm owners within the next 10 years. If financial assistance is not made available more liberally than in the recent past, it is estimated that it will require from 20 to 25 years to make farm acquisition loans to even the first sixty or seventy thousand families.

Adequate legislation is recommended as one of the primary needs to promote better relationship between tenants and landlords, to stabilize the rural population, and to reduce and improve farm-tenancy conditions. In addition to needed legislation, financial assistance should be extended immediately to from forty to sixty thousand tenant farmers, and to others as rapidly as possible, to enable them to become farm owners, to the end that such farmers may achieve sound relationship with the land, thereby contributing to the social and economic betterment of the region.

Tax Reverted Rural Lands

It is estimated that there are approximately 5,000,000 acres or more of agriculturally submarginal tax-delinquent rural land in the region, much of which will revert eventually to public ownership. The States, through their agricultural colleges and State planning boards, have made rather exhaustive studies of such lands, and deficiencies in existing laws relative thereto, which would provide the necessary basis for intelligent programs to cope with this serious and aggravating problem.

It is agreed quite generally that there is a definite need for perfected State legislation to (a) simplify procedures for adjudicating and administering tax-delinquent rural lands and clearing up titles and descriptions, (b) permit the withdrawal of tax-abandoned and other publicly owned lands for needed public uses such as forests, reservoir sites, parks, schools, and institutions, and (c) prohibit the sale or donation of any public land until classified and controlled for proper use.

The State of Arkansas recently enacted a land-policy law,¹ which attracted national attention, under which no tax-forfeited or other public land may be sold or donated unless so classified and controlled for logical public or private use. Similar legislation is urgently needed and should be enacted by the other States in the region.

Water Resources

Water problems and requirements in the region vary from those in the drought areas of the Great Plains to the flood areas of the lower Mississippi Valley. Water conservation, therefore, is essential as a prevention against both droughts and floods. Long-range objectives for the development of the region's water resources are contained in the reports of the drainage basin committees. Many detailed recommendations are proposed therein for water control and use in the region, including farm and ranch water facilities on some 15,000,000 acres generally west of the ninety-eighth meridian in Texas and Oklahoma, floodways, channel improvements, irrigation work, levees, wildlife refuges, and recreational lakes—all of which are important elements in a comprehensive integrated water program. Among the important proposals in the water plan are the following:

Flood Control.—In addition to the 8 reservoirs now under construction, 20 or more new reservoirs should be constructed as funds become available. Reservoirs under construction include Great Salt Plains, Altus, and Fort Supply in Oklahoma; Denison in Oklahoma and Texas; Possum Kingdom and Marshall Ford in Texas; and Blue Mountain and Nimrod in Arkansas. New projects proposed for early construction include Greer's Ferry, Lone Rock, Norfolk, Water Valley, Bell Foley, and Blakely Mountain Reservoirs in Arkansas; Wallace Lake Reservoir in Louisiana; Optima, Canton, Tenkiller's Ferry, Hulah, Oologah, and Wister Reservoirs in Oklahoma; and McGee Bend, Whitney, Hord's Creek, Brownwood (enlargement) Reservoirs in Texas, in addition to 3 dams at and near Rockland. On the lower Mississippi River systems, the Eudora, Morganza, and Atchafalaya floodways, and many miles of levees, are recommended projects.

Irrigation.—During the past 30 years, there has been a steady increase in irrigated areas in all States of the region. In 1929, there were some 5,000 enterprises, with a total irrigated area of 1,403,000 acres. The principal existing irrigated areas include those in the lower Rio Grande Valley, having over 400,000 acres; the Rio Grande project near El Paso, with over 68,000 acres; the Red Bluff project on the Pecos River in west Texas; the Wichita Falls project on the Wichita River in north Texas; extensive rice fields along the lower Colorado River, the coastal plains of Texas and Louisi-

¹ Act No. 331, Statutes of 1939.

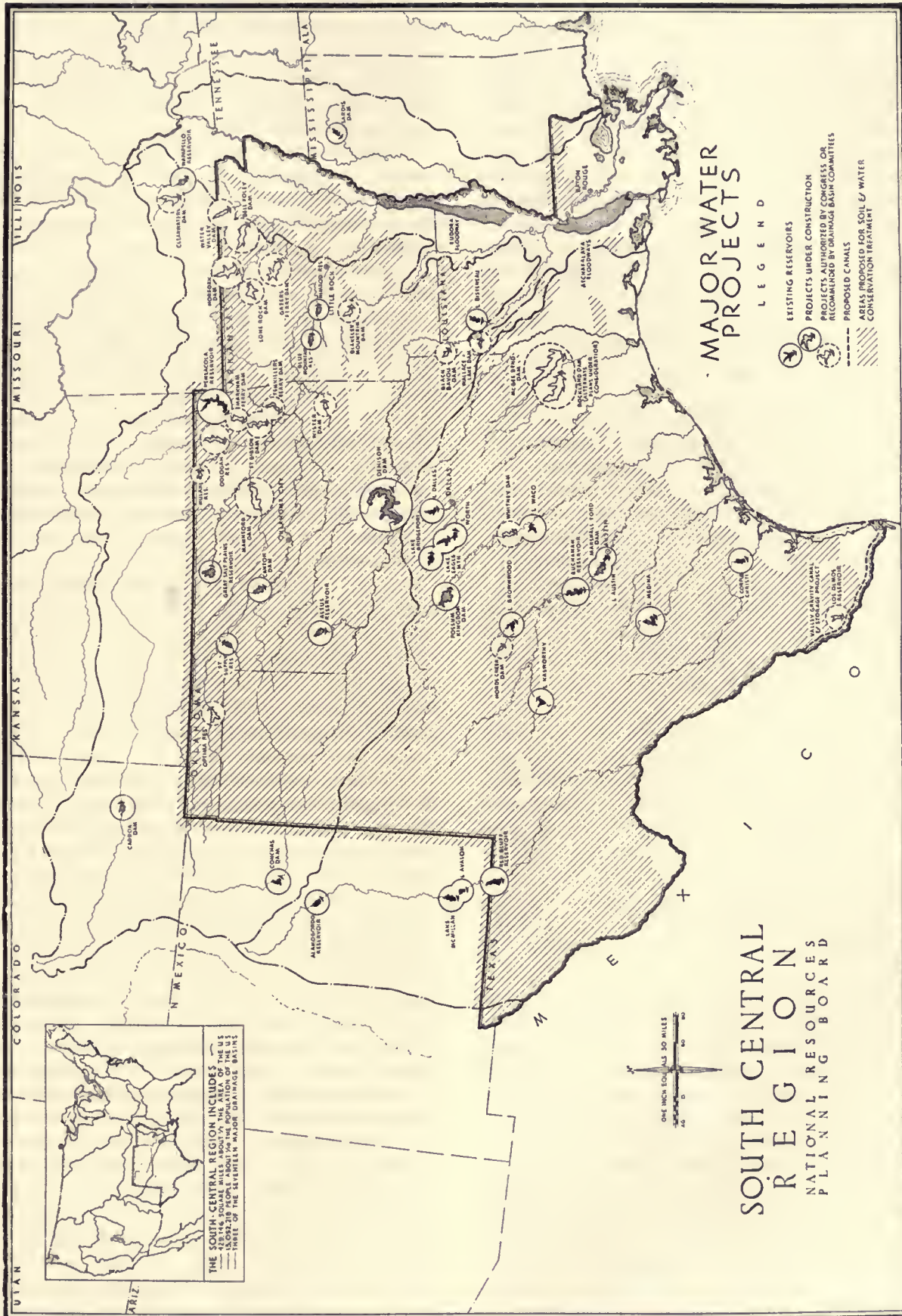


FIGURE 2.—Major Water Projects

ana, and in eastern Arkansas. Additional major projects under construction include the Marshall Ford Dam on the Colorado River in Texas, which is to irrigate 160,000 acres of rice land in the coastal plain, and the Altus-Lugert project in southwestern Oklahoma, which is to serve twenty to seventy thousand acres of land now dry farmed.

Existing projects are of two major types, those located in areas of more limited rainfall and those in humid regions. Projects of the former type are designed to stabilize farming by the irrigation of large areas of land where the average annual precipitation is less than 30 inches, and to form a nucleus for the populace carrying on dry farming and livestock raising in surrounding areas. Those of the latter type are for sporadic irrigation of specialty crops such as rice, citrus fruits, and vegetables.

It may be stated, in general, that unless some peculiar conditions exist to justify the artificial application of water to the land in areas of adequate rainfall, widespread irrigation developments should be limited to that portion of the region with an average annual rainfall of not exceeding about 26 inches. Supplemental irrigation facilities, however, are desirable elsewhere as a reserve against occasional droughts. Large irrigation developments should be coordinated with other water needs in the form of multiple-use reservoirs, such as that now under construction at Lugert, Okla., in order to spread the benefits and thus reduce the project cost to the irrigators.

Investigations on proposed projects are now being made by the Bureau of Reclamation on seven rivers in western Oklahoma and Texas to determine the feasibility of their development for irrigation. Among these are the proposed Optima, Fort Supply, and Canton projects. Detailed studies are also being made on the proposed Robert Lee project near San Angelo, Tex., the Balmorhea project in the Pecos River Basin, and the Mangum project in southwest Oklahoma. Definite project recommendations will await the outcome of these studies.

Because of conflicts among existing irrigation interests in the Pecos River Basin, and the limited amount of water available, a special joint investigation is being made by the National Resources Planning Board with cooperation and financial assistance from the States of Texas and New Mexico, the Geological Survey, Department of Agriculture, and Corps of Engineers, to develop needed factual information with respect to water supplies, water uses and requirements, quality of water, floods and flood damage, erosion, siltation, and other matters. It is anticipated that this fact-finding survey will provide the basis for future compact negotiations between the two States, similar to the activity carried on in the upper Rio Grande Basin about 2 years ago, to

divide satisfactorily the available waters between the various interests. Such allocation of waters will, in turn, determine the future course of improvements in the Pecos Basin. The study is being conducted under the auspices of the Denver regional office, National Resources Planning Board.

More adequate State water laws are needed in the region to protect and conserve underground water supplies for irrigation purposes. The urgent situation in the Grand Prairie rice area of Arkansas is a striking example of this need.

Lower Rio Grande: Two major projects are proposed by the International Boundary Commission to alleviate present water-supply problems in the irrigated areas near El Paso and Brownsville. The first is the valley gravity canal and storage project to supply permanently the lower Rio Grande Valley of Texas. The total cost, including supplemental storage and hydroelectric installation, is estimated at nearly \$60,000,000. Expenditures are to be made over a 5-year period, and it is estimated \$5,000,000 would be needed the first year. The project has received general approval by Congress, but no appropriations have been made for construction.

The project for the El Paso area consists of extending and connecting existing sections of the American Joint Canal to provide a continuous canal from the American Dam to the lower end of the irrigated area, at a cost of \$2,000,000. This work is needed to control the United States water rights in the Rio Grande in accordance with an existing treaty with Mexico. This project is still under investigation.

Pollution.—Serious stream pollution conditions exist in virtually every stream in the region. These should be corrected or alleviated by (a) adopting certain minimum standards for stream purity as recommended by the State sanitary engineers in the region, (b) establishing zones for the different standards, (c) entering into interstate compacts, where necessary, and (d) correcting existing sources of pollution. This will include approximately 534 new or improved sewage-treatment plants and correction of such industrial pollution as is created by oil fields, paper and pulp mills, mines, canneries, either by treatment, dilution, injection into underground sands, or other means. Cooperation between the States and the Federal Government is essential to expand operations in this field in order to protect public health and improve recreational opportunities.

Drainage and Levee Districts.—The use of the fertile agricultural lands in distressed levee and drainage districts in the alluvial areas of Arkansas, Louisiana, and Mississippi should be reestablished by coordinating, rehabilitating, extending, and maintaining existing facilities, and clearing up financial difficulties. Altogether, some 3,800,000 acres of land and about 80,000

rural families would be benefited. The reclamation of these districts would open up about 1,000,000 acres of idle undeveloped land for resettlement by farm families now located on submarginal lands. State and local cooperation, however, is essential in stimulating the necessary action programs to achieve these objectives.

Energy Resources

The region abounds in fuel resources in the form of oil, gas, and coal, and has some water power. As has been indicated, the known oil reserves are sufficient for about 16 years at the present rate of production, while additional reserves are being discovered annually. Gas reserves are tremendous, but are being wasted in vast quantities because there is no economic market for them. Coal and lignite are available in large quantities.

At the present time oil and natural gas are the chief sources of electrical energy in the region, due to their huge quantity, the ease of production, and the cheapness of transportation to generating centers. Small amounts of power are generated by coal, lignite, and water. The total power production in 1937 was 263,000,000 kilowatt-hours by hydroelectric plants and over 6,000,000,000 kilowatt-hours, or 23 times as much, by fuel plants.

The region is generally lacking in potential water-power sites as compared with other parts of the United States. It is estimated that the region has about 6,000,000,000 kilowatt-hours per year of potential dependable water-power development, which is less than 2 percent of the total for the Nation. In 1937 there were some 25 hydroelectric generating stations, which produced about 263,000,000 kilowatt-hours, or only 4 percent of the total amount of water power available for development. Most water-power plants are small units, the largest being on the Ouachita River in Arkansas and on the Colorado in Texas. There are none in Louisiana. The remaining undeveloped water power is fairly well distributed among the four States, with the largest amount in Arkansas. Further development of electrical energy is limited only by the demand. As long as cheap oil and gas are available, it is unlikely that coal and lignite will be utilized to any great extent. Likewise, it is questionable whether water power would be developed further if it were not for the fact that such plants are being considered in connection with large-scale dams for other purposes, such as flood control and irrigation. The construction of dams for other purposes, therefore, may be the determining factor in the development of additional water power in the near future.

Fuels are exhaustible, and water power is not. To conserve fuels, therefore, means to use them sparingly,

while to conserve water power means to use it fully. Every day that potential water power remains undeveloped and fuels are used instead means that much waste of natural resources. Hence, it is recommended that water-power facilities be developed as rapidly as is economically feasible in coordination with other water needs, such as flood control and irrigation. The major hydroelectric projects now under construction are the Pensacola, Denison, Marshall Ford, and Possum Kingdom projects. Others are recommended in connection with proposed dams at Lone Rock, Norfolk, and Blakeley Mountain, in Arkansas; Markham Ferry and Fort Gibson, in Oklahoma; and Whitney, Rockland, and McGee Bend, in Texas.

In the interest of conserving the fuel resources of the region, unit operation is recommended for oil pools instead of the present competitive system of wasteful development. By unit operation is meant the development as a whole of a geological unit according to a definite program supervised by the State, royalties to be shared on the basis of acreage, oil in place, or some general equitable arrangement regardless of the location of producing wells. Unit operation has been advocated at different times for this purpose and also for the purpose of more effectively stabilizing the industry.

In the interest of greater public service and the needs of national defense, existing primary transmission lines should be extended and interconnected so that there will eventually be a regional network of main transmission lines connecting all power sources and load centers. In this way, full use can be made of all generating facilities in meeting the requirements of fluctuating loads and of sudden increases in demand, and in the avoidance of interruptions due to accident or war.

Transportation

The transportation facilities of the region include railroads, highways, waterways, airways, and pipe lines. Collectively, these facilities form a pattern of infinite complexity with many points of contact, much duplication, some unnecessary links, and numerous missing portions. The need for more effective distribution, location, and coordination of these services is quite apparent if they are to serve the best interests of the public in rendering adequate and economical transportation for all classes of traffic.

Highways.—The general framework of principal highways appears at first glance to serve every part of the region, but upon closer examination certain important shortcomings are evident. Among these are the lack of diagonal routes, particularly in Oklahoma; the congestion of converging routes in several of the larger cities and the lack of adequate bypass routes; indirect routes involving wasted mileage of both pavement and operating distance; outmoded road alinement and cross-

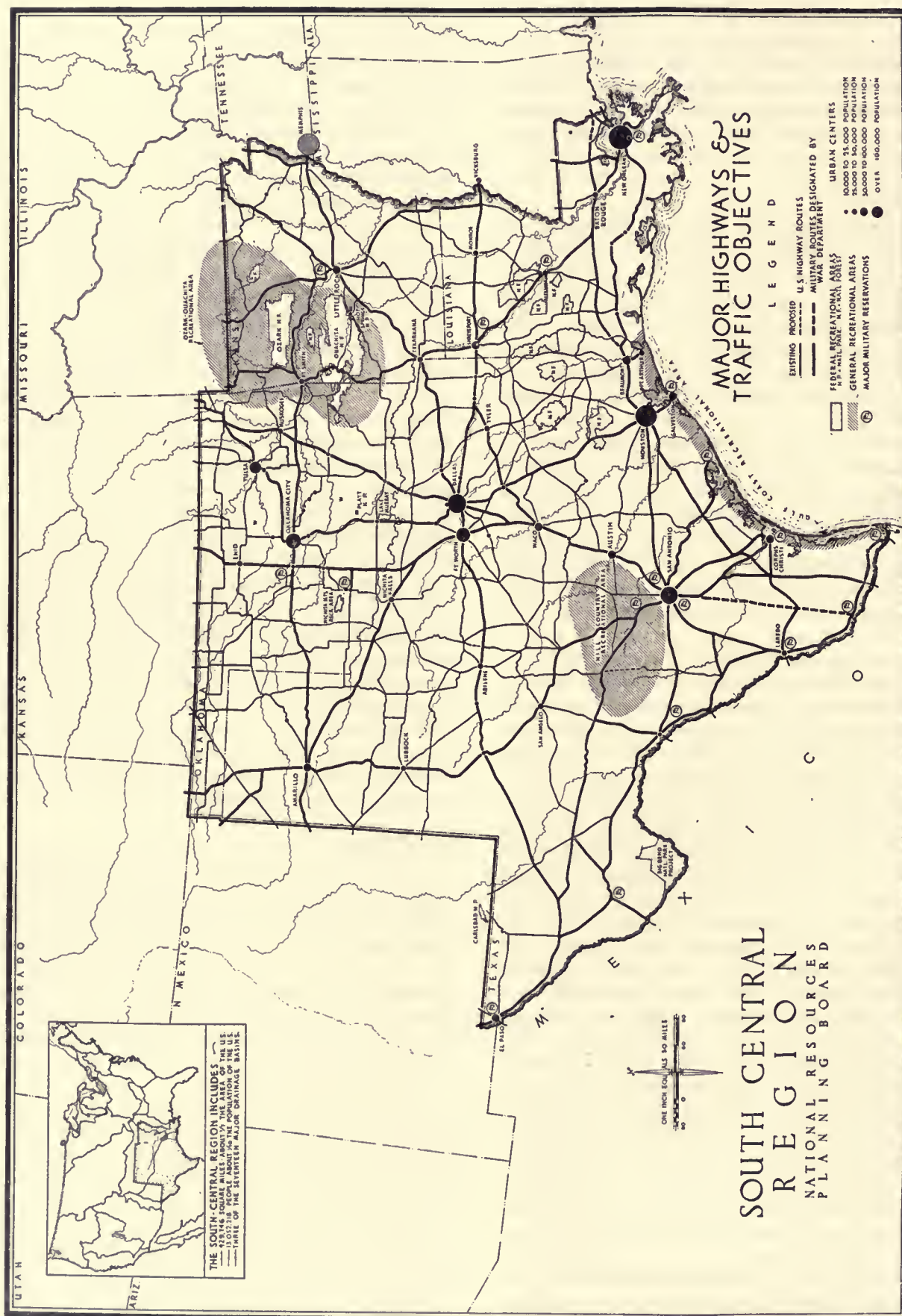


FIGURE 3.—Major Highways and Traffic Objectives

sections; narrow, incomplete, or worn-out pavements on many routes and many narrow and unsafe bridges. These criticisms, of course, are not applicable to all highways. Many thousand miles of modern highways are to be found, which have been built in accordance with the latest standards of construction and safety. Fast and reasonably safe travel is possible throughout most of the region except in the vicinity of the larger cities and through certain closely developed areas, such as the zinc mining district in northern Oklahoma.

A long-range comprehensive plan of major regional highways is needed to serve as a guide for the construction and improvement of all regional and interregional through routes. Such a plan should be based primarily on certain existing State and national highway routes with extensions, realignments, and other improvements. The system should consist of fast, direct, through routes between all principal traffic centers within and beyond the region, with separated grades at important intersections and railroad crossings. Some of the routes should have divided lanes where the traffic volume is heavy. With few exceptions, high-speed "freeways," with limited access and all grades separated, are not deemed necessary in this region, because congestion is infrequent in most areas and the majority of existing highways can be traveled on as fast or faster than the law allows. Highways in the major system should consist primarily of normal two-lane pavements 20 to 22 feet in width with 8-foot minimum shoulders, stabilized and dustless. All bridges would have minimum widths of 26 to 30 feet, and rights-of-way should be 150 feet or more. For traffic volumes of over 5,000 vehicles per day, divided roadways are desirable. Many sections of existing highways would be suitable for inclusion in the regional system, but there would have to be considerable straightening, improvement of grades, widening of roadways, shoulders, and bridges, and construction or reconstruction of pavements.

Railroad grade separations should be constructed in accordance with the regional highway plan, together with suggested plans for railroad reorganization. The latter should indicate which of the railroads are to remain as trunk lines, which as secondary lines, and which to be abandoned.

Other recommended measures include restriction upon open-range practices, the establishment of additional wayside or roadside parks, and the control of roadside development through zoning, easements, restrictions, or other suitable means.

For the immediate program, it is recommended that construction be carried forward on the system of military highways recently designated by the War Department in cooperation with the Public Roads Administration. Within this region, the military system would include 6,375 miles of standard highways connecting

various military reservations, principal cities, and points along the Mexican border and Gulf of Mexico. This system would also serve certain primary civil traffic requirements. The cost is estimated at \$160,000,000, and necessary improvements, based upon present appropriations, would require about 6 years if all available Federal-aid and matching State funds are used for this purpose. It is felt, however, that before any major construction is undertaken there should be some additional study of route relocations for the sake of shortening distances and effecting other economies.

Airways.—Two transcontinental air routes now pass through the region, one of which is the New York-Kansas City-Los Angeles route, and the other the New York-Memphis-Los Angeles line. Additional interregional routes include those from Richmond, Va., through New Orleans to Corpus Christi, Minneapolis to Brownsville, Chicago to New Orleans, Wichita to Galveston, and from Dallas to Atlanta. Other routes for local service within the region are available, but there still remain many points to be served.

Within the region are some of the largest and best-known air fields in the Nation, including Randolph, Kelly, and Barksdale Fields for military use, and the new naval base now under construction at Corpus Christi.

Public use of the several airways presupposes the availability of adequate landing facilities at necessary intervals along the way, especially for the larger transport planes. The Civil Aeronautics Authority has determined, for various types of flying, certain requirements relating to size of field, length and width of runways, lighting, radio, and weather facilities. According to these classifications, there are relatively few fields within the region that measure up to the needs of modern private and public flying. The improvement of existing fields where necessary, and the provision of additional landing areas is an important problem in the region. One of the chief difficulties in developing individual airport projects is in the determination of what facilities will actually be needed. In most cases, considerable uncertainty exists as to demands that will be made upon a particular airport, that is, whether it will be used by transport planes, military equipment, or merely local private ships.

A long-range plan of regional airways is required to meet the ultimate needs of private, public, and military flying. In addition to the existing 3,500 miles of major routes within the region, this plan would include about 3,300 miles of new routes, extensions, and connections. The principal new routes would extend from San Antonio to Amarillo and Denver, from Little Rock to Oklahoma City, from San Antonio to El Paso, and from New Orleans to Shreveport and Kansas City. Several short extensions and connections would com-

plete the system. The estimated construction cost would be about \$2,500,000 for the airways alone, excluding airports. These airways should be fully equipped with adequate terminal airports and intermediate fields, with full lighting facilities, as well as intermediate airway beacons, and with radio ranges and weather communication circuits.

There is a need for approximately 200 new airports and the enlargement of 40 or more existing airports, so that every urban community will have a landing field suited to its needs, in accordance with regional and State airport plans. Several new seaplane bases should be established along the Gulf coast and at appropriate inland points. Uniform State laws pertaining to aeronautics should be adopted in order to correct the present lack of adequate regulations. Cities, towns, and other locations should be marked with standard markings for ready identification from the air.

Railroads.—The eastern half of the region is served by a fairly close network of railroads, while the western portion, where population is more sparse, has but a few through routes and branches. The principal trans-continental routes passing through the region are those of the Southern Pacific, Texas & Pacific, Santa Fe, and Rock Island Railroads. Several others traverse the region from north to south leading to the various Gulf ports, including lines of the Burlington, Santa Fe, Rock Island, Missouri-Kansas-Texas, Kansas City Southern, and Missouri Pacific Railroads. The principal rail route from the United States to Mexico City passes through the region, crossing the border at Laredo, Tex.

In the past 20 to 30 years, the pattern of railroad facilities within the region has changed very little. There has been some new construction of connections, especially in the western portion, and there has also been some abandonment in the eastern portion, where branch lines have outlived their usefulness. In the commercial forest areas of Arkansas, Louisiana, and Texas, numerous logging railroads were built from time to time and abandoned as timber production shifted from one location to another. Due to the highly competitive nature of early railroad construction, there still remains a great amount of duplication of lines between various points and a lack of coordinated operations. Indirect routes are frequently found. The development of bus and truck transportation in recent years has created serious railroad problems due to a failure to coordinate the two services. There is also a lack of general coordination between railroads and barge lines on the principal waterways. Some progress has been made, however, in overcoming these difficulties, as evidenced by the fact that several railroads now operate coordinated bus and truck lines and have extended their services to store-door pick-up and delivery.

One of the outstanding problems in the region is the difference in freight rates established by the Interstate Commerce Commission in comparison with those in the North and East. Such differentials were established originally on the basis of relative density of traffic, but have operated to discourage a natural development of industries in the south-central region, which, in turn, would increase the density of traffic. According to present rates, it costs almost 50 percent more per mile to haul a ton of freight in the south-central region than in the northeastern district.

Railroad abandonments have created certain problems wherever they have occurred, including those of providing substitute services, of reduction in local assessed values, elimination of jobs, abandonment of grade-separation structures, and others, all of which point to the need for long-range development plans.

In its broadest aspects, any regional plan for adjustment of local railroad problems encroaches upon the national railroad problem, which cannot be solved locally. From both the national and regional viewpoints, however, it is desirable in the public interest and convenience to provide improved service and to effect all possible economies through the consolidation of local lines into unified systems, the elimination of unnecessary duplication and branch lines, unification of terminal facilities, the coordination of railroad services with those of airways and pipelines, and the construction of new routes where they would be effective in shortening distances or opening up new markets.

Many regional projects, such as the separation of grade crossings and the unification of terminals, should be determined in accordance with such a national plan; otherwise, it will be impossible to know which lines are to remain and which are to be abandoned. Where lines are eventually to be abandoned, plans should be developed for providing adequate service by other means, such as coordinated truck and bus service, and all possibilities should be explored for utilizing rights-of-way to be abandoned in the future for highway purposes. The details of most of these developments will depend upon a national plan of major railroad reorganization and consolidation, which should be prepared and adopted as soon as possible.

Pipe Lines.—Because of its extensive oil and gas fields, the south-central region contains more miles of pipe lines for the transmission of oil, gasoline, and gas than any other similar area in the United States. Oil and gasoline pipe lines extend from the various producing fields to refinery centers and the principal Gulf ports within the region, and also cross-country to refineries located at St. Louis, Chicago, and other points north and east as far as the eastern seaboard. Natural gas is transmitted from producing fields to all parts of the region for local consumption, and also to

other parts of the United States, principally north, northeast, and east, as far as St. Paul, Chicago, Philadelphia, and New York. Additional pipe lines are being built annually at a tremendous rate.

Although most of the pipe lines that collect oil or gas from the producing areas and many of the cross-country lines are privately owned, there are a number of common-carrier systems, and these services are operated in almost complete independence of other connecting forms of transportation.

It is believed that natural-gas pipe lines should be extended as rapidly as possible to additional markets in various parts of the United States, in order to provide an outlet for the tremendous volumes of this natural resource that are now being wasted and exhausted into the air. It is also recommended that an investigation be made as to the advisability of utilizing private pipe lines as common carriers when they are not in use for private operation. Such a practice would tend to develop the full use of existing facilities and thus avoid unnecessary duplication.

Waterways.—The region contains numerous rivers that have at one time or another been suitable for navigation. Such streams as the Mississippi, Arkansas, Ouachita, White, Red, Trinity, and Brazos served as important arteries for early-day settlement and transportation. Many of these and other streams have been developed into commercial waterways, some of which are among the most important in the Nation. The Mississippi River, for instance, serves as the trunk line of the vast inland waterway system serving the entire central United States, while the Intracoastal Canal, extending along the Gulf from New Orleans to Corpus Christi, serves as a feeder for numerous branch waterways extending up the principal streams. Deep-draft waterways of 30-foot depth or more for seagoing traffic extend up the Mississippi River to New Orleans and Baton Rouge, up the Sabine River to Beaumont, up Buffalo Bayou to Houston, and up the Nueces River to Corpus Christi. Other principal waterways are from 9 to 30 feet in depth, and still others are less than 9 feet. Many of the latter waterways are not yet fully developed but are authorized for improvement in accordance with approved depths. Among these are the Arkansas River to Muskogee, Okla., and the Red River to Denison, Tex. Additional projects are being proposed from time to time, often for the purpose of securing lower freight rates. Further extensions of the waterways system that have been studied and are recommended for early construction are (a) the deep-water channel to Lake Charles, La.; (b) a 9-foot channel in the Guadalupe River to Victoria, Tex.; (c) a navigation canal along the Trinity River to Fort Worth, Tex.; (d) straightening and deepening of the intra-coastal waterway to a depth of 12 feet and extension

to Brownsville, Tex.; and (e) widening and deepening of the Mississippi River deep-water channel to a depth of 35 feet from Baton Rouge to New Orleans, and 40 feet from New Orleans to the Gulf. In addition, there should be a study of possible cross-connections between the upper ends of the longer navigable rivers, in order to save time in interregional movements, and as a national-defense measure.

Industry

There are several indications of the lack of industrial development in the south-central region as compared with the United States. For instance, the region has nearly 10 percent of the national population, but has only 5 percent of the industrial establishments, 3 percent of all the wage earners in manufacturing establishments, and produces only 4 percent, by value, of all the manufactured products. Moreover, the industries of the south-central region were responsible for only 3 percent of the Nation's total wealth created by manufacturing. In other words, manufacturing processes in the south-central region add but 30 percent to the finished value of its manufactured products, while for the United States as a whole the average is over 41 percent.

At present the 10 principal industries in the region, in the order of the wealth that they create through added values, are petroleum refining, \$169,000,000; lumber and timber products, \$65,000,000; printing and publishing, \$56,000,000; machinery, \$47,000,000; meat packing, \$23,000,000; beverages, \$22,000,000; cottonseed products, \$20,000,000; paper and pulp, \$18,000,000; milling, \$15,000,000; and sugar, \$11,000,000. Sugar refining is the fourth ranking industry in Louisiana, while the refining and smelting of zinc is an important activity in Oklahoma. Other manufacturing activities are also important in certain localities.

It is significant to note that the great majority of raw materials produced within the region are shipped elsewhere for processing, although plentiful supplies of fuel and other materials and facilities required by industry are available, and nearly 10 percent of the potential consumers in the Nation reside within the region. Texas produces more cotton than any other State in the Nation, yet there is practically no local processing of this raw material into finished goods. Most cotton goods and garment manufacturing is conducted along the Atlantic seaboard. The region is one of the chief producers of cattle, yet very little leather is processed or footwear manufactured within its borders. Texas produces 20 percent of the Nation's wool and 80 percent of its mohair, yet there is practically no textile industry in the State. In fact, until recently there was not even one wool-scouring plant within the region.

The State of Arkansas reports that in 1936 the esti-

mated value of all goods brought into the State, including raw materials, exceeded the value of goods exported by nearly \$55,000,000. Texas reports that it imports from other States and countries vastly more manufactured goods than it produces for both home and outside markets.

The opportunity to sell goods, either raw or manufactured, depends upon the availability of markets. One type of market is made up of local consumers, and the other of export business. In the south-central region, there is a population of nearly 13,000,000 people, which, in itself, is a sizable consumer market and uses a great diversity of products. The principal consuming centers outside the region are those in the northeastern and southeastern sections of the United States, and those in foreign countries, particularly Mexico and South America.

All four States in the region are conscious of the need of furthering their industrial development in the light of the vast stores of diversified minerals, the agricultural, forestry, and energy resources, the transportation facilities, and other elements present in the region that would contribute to successful industrialization. Moreover, there can be little doubt that the region should enjoy a greater portion of the Nation's industrial development. One of the outstanding obstacles militating against the industrialization of the region is the unreasonable freight-rate differential; and once this difficulty is adjusted, the opportunities for industrial development will be greatly enhanced. To overcome discriminatory freight rates, the region has developed its water transportation facilities to a considerable extent, by which it ships large quantities of oil, cotton, and other raw products to the east coast and foreign countries, and the further development of inland waterways should prove to have a stimulating effect upon industrial expansion.

It is also encouraging to note that all the States in the region now have industrial agencies, which are beginning to make strenuous efforts to obtain greater returns on their natural resources through processing and manufacturing. The increased interest in the development of farm chemurgy and other chemical research holds considerable promise for this section of the Nation.

In order to develop industries capable of utilizing the region's resources for manufactured products, such as iron, steel, aluminum, chemicals, plastics, pulp, paper, starch, vegetable oils, leather goods, fabrics, clothing, glass, and building materials, at least the following major activities are necessary: (a) Secure equitable freight rates; (b) extend research facilities to develop new products, new uses, and new processes; (c) disseminate authentic information and impartial advice to prospective industries; (d) extend such facil-

ities as electric power, gas, communication, water, fuel, transportation to areas suitable for industrial expansion; (e) construct modern low-cost housing for industrial workers within easy access of suitable industrial areas; (f) train native workmen in the special skills necessary to new production methods.

As far as possible, there should be a wide diversification of industry within the region and in each local area. Processing and manufacturing plants should be located as near as possible to the sources of raw materials and in the line of flow to consuming or distributing centers.

Rural Electrification

Rural electrification has advanced somewhat more slowly in the south-central region than it has in the United States in general. Of the 1,137,571 farms in the region in 1935, only 23,000, or 2 percent, were receiving high-line electric service in 1936. Since that time, the Rural Electrification Administration has stimulated electrification through the medium of loans to farmers' electric cooperatives, public utilities, and municipalities; and largely as a result of this stimulation, the number of electrified farms had increased by 1940 to an estimated 135,000, or 12 percent of the total. At the same time, however, the percentage of electrified farms throughout the Nation was increasing from about 10 percent to over 30 percent.

At the present time, there are 120 or more electric cooperatives serving nearly every part of the region. The principal unserved areas will be found in the more sparsely populated sections, particularly the Ozark-Ouachita mountains, the north and south parts of the western range lands, and the piney woods. The only obstacles in the way of further rural electrification seem to be those of providing service to isolated locations and of increasing farm incomes to the point where the farmers can pay for electric service. In many parts of the region, the farm families have so little cash income that they are unable even to purchase coal oil or candles for lighting, much less buy electricity. They simply go to bed when it grows dark. In some cases, employment in the construction of power lines has provided supplementary incomes for the farmers to enable them to pay for house wiring and the purchase of appliances, but there are undoubtedly many areas that still could not support rural electrification in their present state of economic development.

It is recommended that rural electric lines be extended to serve eventually every farm in the region where electric service is economically possible. This will include virtually all the farms in the Mississippi alluvial valley, the agricultural portions of the central farm belt, and other designated agricultural areas. In addition, electric lines will probably be feasible in

many of the smaller valleys and upland prairies to serve groups of people who now live in the hills. Care should be taken not to develop power lines in areas where an extensive thinning out of population is recommended.

If the continued demand for more rural power lines is met with additional Federal loans to assist farmer-owned cooperatives, private utilities, and municipalities, it is estimated that about 30 percent of the region's farms can be electrified by 1947.

Housing

The housing problem in the south-central region has probably never been stated quite so vividly as in the report prepared by an advisory committee of southern citizens on economic conditions of the South.² In this report, which relates generally to the 13 Southern States, including Arkansas, Louisiana, Oklahoma, and Texas, it is stated among other things, that houses in the rural South are the oldest, have the lowest value, and have the greatest need of repairs of any farm houses in the United States; that only 5.7 percent have water piped to the house and only 3.4 percent have water piped to the bathroom; that more than half the farm houses are unpainted; that more than a third do not have screens to keep out mosquitoes and flies; that half of all the families in the South should be rehoused; that 26 percent of the city or town households are without indoor flush toilets, as contrasted with 13.1 percent for the city and town households of the country as a whole; that in extensive rural districts there are not only no indoor flush toilets, but no outdoor privies even of the most primitive sort; that nearly a fifth of all southern farm homes have no toilets at all; that in these regions hookworm infection and consequent anemia have flourished as a result of soil pollution; that there is extensive overcrowding in the town areas; that in 19 southern cities over 40 percent of all dwellings rent for less than \$15 a month, or are valued at less than \$1,500; that the average farm house is worth only about \$650 and the average farm renter's house, only \$350. One paragraph from the report is quoted as follows:

The type of slum most usual in southern towns consists of antiquated, poorly built rental quarters for working people. The rows of wooden houses without any modern improvements, without proper sanitary facilities, and often without running water, are usually in congested areas, and in the least desirable locations. Often they are next to mills or mines where the tenants work, or on low swampy land subject to floods and no good for anything else. They are usually far removed from playgrounds and other recreation areas. The southern slum has often been built to be a slum. It is simply a convenient barracks for a supply of cheap labor. Lack of running water and impure water supplies are common in southern slums. Bath-

² Report on Economic Conditions of the South. Prepared for the President by the National Emergency Council, 1938.

tubs, sinks, and laundry tubs are among the bare necessities that are often lacking in slum dwellings. Sometimes city water is supplied through a yard hydrant shared by several families. Surface wells are often contaminated on the farms and in the villages and small towns. Contaminated milk and contaminated water, frequently found, cause typhoid fever, which is becoming a widespread rural disease in the South.

Obviously, the provision of decent housing for all its citizens is one of the region's greatest needs.

As an ultimate goal, it is recommended that every rural and urban family in the region be provided with a safe, sanitary, and healthful place in which to live. This will involve the replacement of all existing structures that are beyond repair, and the elimination of all rural and urban slums, makeshift dwellings, and dug-outs. New houses, however, should not be constructed where they will tend to perpetuate uneconomic farm units or ill-advised farmstead locations. There is a realization, too, that housing standards, especially for rural houses, should not be set too high for the lower-income groups. The important thing is to secure good, durable, sanitary houses at a minimum cost, even if some desirable modern conveniences have to be omitted. Studies are now being made to develop practical housing standards for rural areas.

As an immediate goal, it is recommended that all dilapidated dwelling units that are capable of satisfactory repair be repaired, including painting, screening, and ratproofing.

Constant and concerted efforts should be made toward these ends through private enterprise with or without Federal cooperation. Federal stimulation toward rehousing is afforded by the National Housing Act of 1934, which provides for loan insurance through banks and other financial agencies for new construction and repairs. Loans up to 90 percent of the full value, at favorable terms, and for periods up to 25 years are made possible. Large-scale housing is carried on through loans to local housing authorities for both urban and rural housing projects, and there are now 40 or more city or county housing authorities in the region. Arkansas has adopted a State law authorizing the creation of both urban and rural housing authorities, while Louisiana and Texas provide only for urban authorities. Oklahoma provides for neither. Additional State laws should be enacted where necessary to provide for both rural and urban housing authorities.

Health

While the death rate from all causes is lower in the south-central region than in the United States as a whole, due to the average "younger" population, the rates for certain preventable or environmental diseases are much higher than in other sections of the country. Among these are pellagra, tuberculosis, malaria, and typhoid.

Pellagra, which results from diet deficiencies, is serious in Arkansas and Louisiana and also in eastern Oklahoma and Texas. It is more common among Negroes than whites, and although the number of deaths is not particularly great, the number affected by the disease is considerable.

Tuberculosis, like pellagra, is most serious among Negroes, who are affected about four times as often as the whites. This disease may be attributed in part to the low economic status and inadequate diets of the rural population.

Malaria, too, is more common among Negroes than whites, the number of cases being about double. It is most serious in the low swampy parts of the region, where drainage work and mosquito control are usually required.

Typhoid, which affects both the whites and Negroes alike, is due largely to insanitation and could be reduced by proper sanitary facilities, especially in the rural sections.

Typhus, a contagious fever, has increased appreciably in the region during the past decade. The most effective control of this disease involves the elimination of rodents in buildings, particularly where food is stored.

Other preventable diseases are prevalent in the region, such as silicosis in the lead and zinc mining districts of northeast Oklahoma, although tuberculosis is much more prevalent in these mining areas.

Adequate medical and hospital facilities are of first importance in dealing with all diseases. Such facilities, however, are seriously inadequate in the south-central region. It is estimated that one-third to one-half of the people in the area, whose incomes are under \$750 a year, are receiving inadequate or no medical services. Some communities and extensive rural areas are without hospital and other institutional facilities. Doctors, too, are often beyond the economic reach of large portions of the population. Among other important factors contributing to the public health problem is that of poor, insanitary housing.

The regional development program, therefore, should be concerned with the improvement and wider distribution of hospital and clinical facilities, the provision of better roads to make these facilities accessible to rural people, removal of people from isolated areas, and the raising of economic levels in order that people may be able to avail themselves of medical and hospital services.

Numerous projects should be undertaken for the provision of safe and adequate water supplies for both urban and rural people. Sewerage systems and sewage-disposal plants should be constructed wherever necessary to protect the public health. Rural sanitation should be effected through the construction of thousands of sanitary privies and other waste-disposal facilities. Swampy places in the vicinity of inhabited areas should

be drained, and all ponds, lakes, streams, reservoirs, and other water-retaining facilities should have proper engineering and treatment for mosquito control. All dwellings should be fully screened, well ventilated, and ratproofed. Balanced diets are important and should be made possible by the growing of enough green vegetables and the production of enough milk and eggs on each farm to supply adequately the farm family.

Education

Despite the fact that the south-central region has numerous institutions of higher learning, its educational level is still relatively low as compared with other sections of the United States. Moreover, the region is high in illiteracy, especially in the eastern half, where Negroes constitute a high percentage of the population. While the national percentage of illiteracy in 1930 was 4.3 percent, this region averaged 5.6 percent, which is 30 percent higher than the average for the Nation. The rate of illiteracy for Negroes is 11 times as high as that for the whites, and 20 percent of the regional population in 1930 was Negro. Excessive illiteracy among these people is due apparently to the lack of schooling in the passing generation, because illiteracy rates are declining in proportion to the education of the present generation. All illiteracy rates declined considerably from 1920 to 1930, and it is anticipated that further declines will be evidenced by the 1940 census. Even though numerous studies are being made, nevertheless much remains to be done.

The great bulk of the population depends for its education primarily upon the public-school system of elementary and high schools. In the south-central region, the district system, consisting of small independent school districts under local support and control, prevails. In Louisiana, however, the school system is based upon the parish unit. According to the best available information, there are at least 16,000 separate school districts in the region, each of which is a separate taxing and administrative unit. Thus, it may be seen that the present school pattern in the region is based upon a framework designed years ago when transportation was slow and school attendance relatively low. Further, the school year in this region is still somewhat shorter than in the Northern States. In 1930 the average number of days each pupil was in school in Texas and Louisiana was from 120 to 130 days, and in Arkansas and Oklahoma less than 120 days, as compared with the average attendance in the Northeastern States (Missouri to Maine) of between 155 and 165 days.

One of the great problems facing school authorities is the declining use of existing schools, resulting from reduced birth rates and consequent gradual reduction in the number of children of school age. This imposes an organization problem. The instability of the rural

population in many areas, occasioned by widespread tenancy, farm abandonment, migration, and migratory workers, poses not only the problem of an increasing financial burden for the remaining population, but also makes it difficult for the moving population to secure adequate education.

Housing facilities for schools are woefully inadequate throughout much of the rural area. Modern facilities, such as libraries and laboratories, are in many cases totally unknown. High schools are within the reach of only a part of the rural population. There is a high percentage of Negroes in the total population for whose use separate schools are maintained. Indian children, however, of whom there are some 35,000 in Oklahoma alone, are cared for in Federal Government schools and through payment of tuition for them in approved public schools.

The outstanding problems affecting public educational facilities are generally related to population decreases and fluctuations in many rural areas, declining county income for school purposes, scattered and isolated settlements, bad roads, inefficiently small administrative units, and the high percentage of Negroes for whom separate schools are required. To overcome these difficulties, there is a perennial plea for more and more financial assistance from State and Federal sources, but this alone cannot solve them. A radical readjustment in the pattern of school facilities and administrative units is imperative and must be worked out in accordance with a long-range coordinated plan that will relate school facilities to land use and population distribution. More attention should be given to vocational and adult education in the future.

Public-library facilities are necessarily a part of a general educational scheme, and the use of such facilities is a further indicator of the relative educational standards of any given locality. In the south-central region, the States of Arkansas, Louisiana, Texas, and Oklahoma rank, respectively, second, fifth, seventh, and eleventh lowest in the United States in the per capita circulation of public-library books. Many sections are without library facilities, but traveling public-library service "bookmobiles" make a limited number of volumes available to the rural population in each of the four States.

A modern system of public-school facilities to serve the region in the future should be designed along the following lines:

1. Schools should be located only in those areas in which the population will remain or in which new population is to be introduced.

2. Isolated one- and two-room schools should be eliminated in favor of larger, centrally located, modern structures having modern equipment, libraries, laboratories, and the like, and adequate teaching staffs.

3. Transportation to the consolidated schools should be furnished for all pupils beyond reasonable walking distance.

4. There should be a high school within reach of every populated locality.

5. The size of school units should be determined carefully in view of the expectation that the scholastic census will continue to decline in accordance with reduced birth rates, other factors being constant.

6. Administrative units should be reorganized into large efficient organizations under expert educational directorship and adequate administrative staff.

7. Each school should be located on an adequate site and provisions made for recreation and community-center facilities to serve the community in out-of-school hours.

8. Public libraries should be established through State aid, or otherwise if necessary, within reach of every populous section, or effective traveling library or branch library systems should be set up to operate from a central headquarters. Book distribution through the public schools is one means of accomplishing this objective.

Other improvements, such as full grades, higher teaching standards, a longer school year, and more vocational training, should also be a part of the educational program.

Recreation

The south central region possesses a wide variety of recreational resources. Among these are outstanding mountains, rivers, lakes, springs, canyons, beaches, and historic, archaeologic, scientific, and scenic areas, as well as many interesting cities. The Ozark-Ouachita Mountain area in Arkansas and Oklahoma is the largest natural playground in the region and for some distance beyond. The hill country in south central Texas serves as a resort area for much of that State. The Trans-Pecos region includes the Big Bend country, a primitive mountainous region in southwest Texas adjacent to the Rio Grande, which is an area of national importance. The 700 miles of Gulf coast include some of the finest beaches and fishing waters in the world. Excellent hunting areas for both small and large game are to be found in various parts of the region, and other recreational opportunities, such as Lake Murray in Oklahoma, abound elsewhere.

There are at present within the region 2 national parks (Hot Springs in Arkansas and Platt in Oklahoma), 1 national monument (Chamlette in Louisiana), and 1 national-park project (Big Bend in Texas), 7 national forests, and 17 other national recreation areas of various kinds. Together, the existing national-park areas contain more than 456,000 acres exclusive of the national forests, which add another 2,821,000 acres.

In addition, there are 75 or more State parks of various sizes and types, and numerous local parks in the various municipalities, but it is surprising to find that county parks are practically unknown. Parks or roads restricted to pleasure or passenger traffic only are also lacking, although roadside improvement has been in general practice throughout the region, and small roadside parks have been established at many points. Texas boasts of 674 roadside parks, and Oklahoma has at least 21 such areas.

Among the various recreational problems requiring special attention might be mentioned the need for providing suitable recreational facilities for rural people in the more sparsely settled sections; for providing adequate access to park units; for developing recreational parkways; and for developing park areas in conjunction with reservoir projects. The failure to plan, acquire, and develop appropriate shore-line areas in connection with reservoir development has in several cases resulted in complications, due to the public demand for access to and use of the water areas. In most instances, adjacent property has been bought up by private interests for speculative purposes, and the general public has been deprived of its rightful enjoyment of these valuable recreational opportunities.

The major recommendations in the regional recreation plan are as follows: (1) Complete the acquisition and development of the Big Bend National Park and the Palo Duro State Park in Texas; (2) develop the Mississippi River Parkway in accordance with detailed studies yet to be made; (3) develop a Gulf coast parkway between the Mississippi River and the lower Rio Grande Valley and Mexico; (4) develop the Texas Gulf coast beaches and lagoons for comprehensive public recreation; (5) create additional park units in the Ozark-Ouachita Mountain region and encourage the full use of this area for public recreation of all kinds; (6) develop the Arbuckle Mountain-Lake Murray-Platt National Park area for additional public recreation; (7) provide State and local parks and parkways in accordance with State recreational area studies; (8) establish recreational areas on the shores of reservoirs in accordance with State recreational studies; (9) acquire and preserve scenic, historic, archeologic, and scientific sites having State or national significance.

The acquisition and development of public recreational areas presupposes that there will be adequate administration, operation, and maintenance so that the public may obtain the full use and benefit of the areas.

Wildlife

As indicated earlier in this report, the wildlife resources of the region and their use in hunting, fishing, and other recreational pursuits, as well as for commercial purposes, represent substantial values in this

area. A number of important wildlife sanctuaries have been established through the combined efforts of private, State, and Federal agencies and individuals, including such large areas as the Sabine Lake, White River, Rockefeller, Russell Sage, and Wichita Mountains Refuges. Further specific improvements to fill out in part the regional requirements for wildlife conservation are recommended as follows: (1) Preservation of the Louisiana tidal marsh as a primary wildlife area, including some development work to correct damage caused by the cutting of canals through the marshes, the prevention of future uneconomic drainage enterprises, and some development of water-control structures in selected parts of the marsh for the purpose of wildlife management; (2) one or more migratory-waterfowl areas in the lower Rio Grande Delta; (3) several wildlife projects on existing or future reservoirs, such as Denison, Inks, Austin, Marshall Ford, Buchanan, or Robert Lee; (4) an area in the northwest part of the Texas Panhandle for migratory waterfowl.

In the interest of commercial and sport fishing, industrial plants should be required to dispose of all poisonous wastes harmlessly instead of dumping them into the streams. Wildlife-management plans should be included in all land-management and resource-development projects. In general, it must be recognized that private and public lands other than refuges, on which wildlife may be considered only of secondary importance, must be depended upon to provide the bulk of protection to the wildlife resource.

Incomes

The south central region, with about one-tenth of the population of the United States, enjoys only about one-sixteenth of the national income. It had only three-fifths as much income per capita in the prosperous year of 1929 as did the whole Nation. The per capital income in Texas was about three-fourths as high as the national average, in Oklahoma two-thirds, in Louisiana less than two-thirds, and in Arkansas less than one-half.

For the region as a whole, the average per capita income in 1929 was about \$460 as against \$750 for the United States. Texas was highest with \$509 per capita, Oklahoma next with \$483, then Louisiana with \$428, and finally Arkansas with \$308. These figures, of course, do not reveal the many individual incomes in each State that are lower than the average. In Oklahoma, for example, one-third of the farmers make less than \$300 per year, and in Louisiana, out of a total of 64 there were 44 in which the per capita cash income in 1936 was less than \$100. In one parish it was as low as \$26 for the entire year, and the highest per capita income reported for any parish in the State was only \$260. These figures do not include any relief or other Government bonus payments.

In comparison with other parts of the United States, the plane of living in this region is considerably less than the average. According to Goodrich and others in *Migration and Economic Opportunity*, the plane of living in the South Central States in 1928-29 was on the average less than 40 percent of that in the North Central and Northeastern States. In some areas it was as low as 15 percent. This low plane of living is undoubtedly due to the high percentage of rural people and the handicaps they endure because of the many problems affecting agriculture and other rural pursuits.

The principal source of income in the region is mineral production, which in 1937 was valued at over 1½ billion dollars. Manufacturing was second with \$816,000,000 value and farm products third with \$798,000,000. Comparative figures on other important sources of income, such as trading, transportation, personal services, and the professions, are not available.

It appears from a study of available information that the raising of income levels in the south-central region will depend primarily upon an increase in manufacturing, but there is also a need for greatly increasing the levels of farm income. Supplemental incomes should be developed through part-time employment in forestry, forest-products manufacturing, mining, recreational services, and other activities, and by realizing the cash value of hunting privileges and similar services. There are many things in the farm situation, however, that are basically wrong, and that cannot be corrected merely by raising price levels, controlling production, and finding supplemental incomes. Some of the more fundamental problems, as discussed elsewhere in this report, are inadequate farm sizes, improper types of farming, depletion in soil fertility, and farming of non-agricultural land. The regional plan should strive to correct such problems as these.

Urban Areas

According to preliminary 1940 census figures the region has 81 cities of over 10,000 population. The principal cities of over 100,000 population are New Orleans with 492,000, Houston with 386,000, Dallas with 293,000, San Antonio with 253,000, Oklahoma City with 204,000, Fort Worth with 178,000, and Tulsa with 141,000. New Orleans and Houston are among the 21 largest cities in the Nation. It will be noted that the State of Arkansas has no city over 100,000 population, Louisiana has only 1, Oklahoma 2, and Texas 4. All of these cities, with the exception of New Orleans, are located in a belt extending through central Texas and Oklahoma. Other cities of smaller size are located in various parts of the region.

Most of the larger cities are either general manufacturing, wholesale, and retail centers, such as Dallas,

San Antonio, Oklahoma City, Fort Worth, and Tulsa, or important seaports, such as New Orleans, Houston, Beaumont, and Corpus Christi. Tulsa, the headquarters for numerous oil companies and industries, is known as the oil capital of the world. Austin is primarily a State capital and university city, and there are certain resort cities, such as Galveston, Hot Springs, New Orleans, and San Antonio. Among the smaller cities there are a number of oil-boom towns, but the majority are shipping and marketing centers for the surrounding countryside.

Most of the cities of 50,000 and over have been increasing steadily in size, the growth from 1930 to 1940 ranging from 107 percent down. Losses were experienced by a number of cities, the maximum being 10 percent. The extent of increases or decreases is usually due to local factors. Most increases are the result of the mass movement of surplus farm population to the cities, where industrial and other opportunities are sought. A number of former oil-boom towns and some of those affected by prolonged droughts have quite naturally shown a loss in population.

While individual cities may regard their serious problems as primarily local, a few of these affect the region in general. Blighted areas and substandard housing, as discussed in other sections of this report, are so common that the net effect upon the welfare of the region is serious. The premature expansion of city subdivisions into outlying areas creates a blight on rural areas that is most detrimental. Too few of the smaller cities are directing their development according to well-considered plans, as city planning is very laggard within the region. More careful planning is especially important for cities that are built upon oil development or other boom factors, in order to avoid the problems of speculative overdevelopment as against sound conservative growth.

Every growing city and town should have a carefully prepared plan of general development as a guide for all new construction and expansion. The emphasis should be primarily not on growing bigger but on becoming better, in order to improve the standards of living and increase the opportunities for earning more adequate incomes.

Defense

While the proposed regional plan is not predicated upon wartime emergency needs, it should and does provide a social and economic framework with which the national-defense program can be integrated. It provides a means, for example, whereby new emergency developments may be absorbed into the local economy after the emergency has passed, thus avoiding the creation of serious new problems which would otherwise result from later deflation.

Insofar as possible, therefore, all national-defense projects should be channeled through the State planning boards and be related to the regional development plan. Only in this way can proper integration be had with a coordinated development plan for the area.

Economic Opportunities and Social Advantages

Despite the many major problems that have retarded and will continue to retard its progress until corrected or substantially alleviated, the south-central region is endowed with a tremendous wealth of natural resources and advantages which, if used wisely, can contribute generously to a more abundant life, not only for its present population, but for the greater population to come.

Its abundant mineral resources, its extensive areas of lands that are still good for crops, forests, and grazing, its climate, and excellent recreational areas both developed and potential, all coupled with its relatively youthful and stanch population capable of assimilating a good education, which the region can afford to provide, form economic and social assets, which if planned for, developed, and controlled, must inevitably make this region one of the most wholesome and prosperous areas in the Nation.

The attainment of that objective will be slow, costly, and at times disheartening, but it can be reached. Even yearly, the results of adherence to plans for long-range objectives will be material and encouraging. Nevertheless, the continuous study of new problems, the refinement of the general plan indicating the direction and extent of desirable future growth and changes, and the advance programming of public works will all be necessary to avoid haphazard development which has proved so costly and inconvenient in the past.

Faced now with recurring droughts, inadequate water control, overgrazed pastures, uneconomic farming units, tenancy, substandard housing, low incomes, inadequate medical, sanitary, and educational (in the vocational field particularly) facilities, a substantial

portion of the people of the region merely exist. Their plight constitutes a brake upon the general prosperity.

The solution of these and other problems must be brought about through comprehensive planning for the development of the region, so conceived and conducted as to restrain immediately those practices that would destroy present sound conditions, and at the same time permit correction or alleviation of existing evils and promote the gradual elevation of the plane of living.

Through the cooperation of Federal, State, and local governments, and with public understanding and support, many things can be accomplished in the region to correct permanently existing problems. It is possible to visualize a comparatively prosperous and happy people engaged in a variety of occupations suitable to their talents. Instead of present waste, there will be conservation; instead of isolated farms without conveniences and essential facilities, there will be compact communities in areas free from the ravages of drought or flood, with decent housing, proper sanitation, utilities, accessible schools, and other desirable conveniences.

One can foresee that in the future, industry, recognizing the abundance of skilled labor provided through a comprehensive vocational-education system, and desiring to locate near the source of raw materials, will have become blended in the economic life of the region. It will have afforded supplemental incomes to many whose chief endeavor will still be agriculture. The forests will no longer stand idle. They will produce timber, pulp in vast quantities, and manufactured products for the Nation, but consumption will never exceed the supply.

Wildlife will be plentiful, and close at hand will be recreation for those who desire it. The urban dweller will be able to obtain the form of physical diversions he needs because of his environment. The farm population will find diversions suitable to their desires.

No longer will the population migrate elsewhere in search of a better existence. They will have increased materially in numbers and will enjoy a wholesome and satisfying life.

PRELIMINARY STATEMENT REGIONAL DEVELOPMENT PLAN
MISSOURI VALLEY: REGION 6, OMAHA, NEBR., 1940

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Report of the Missouri Valley Regional Planning Office

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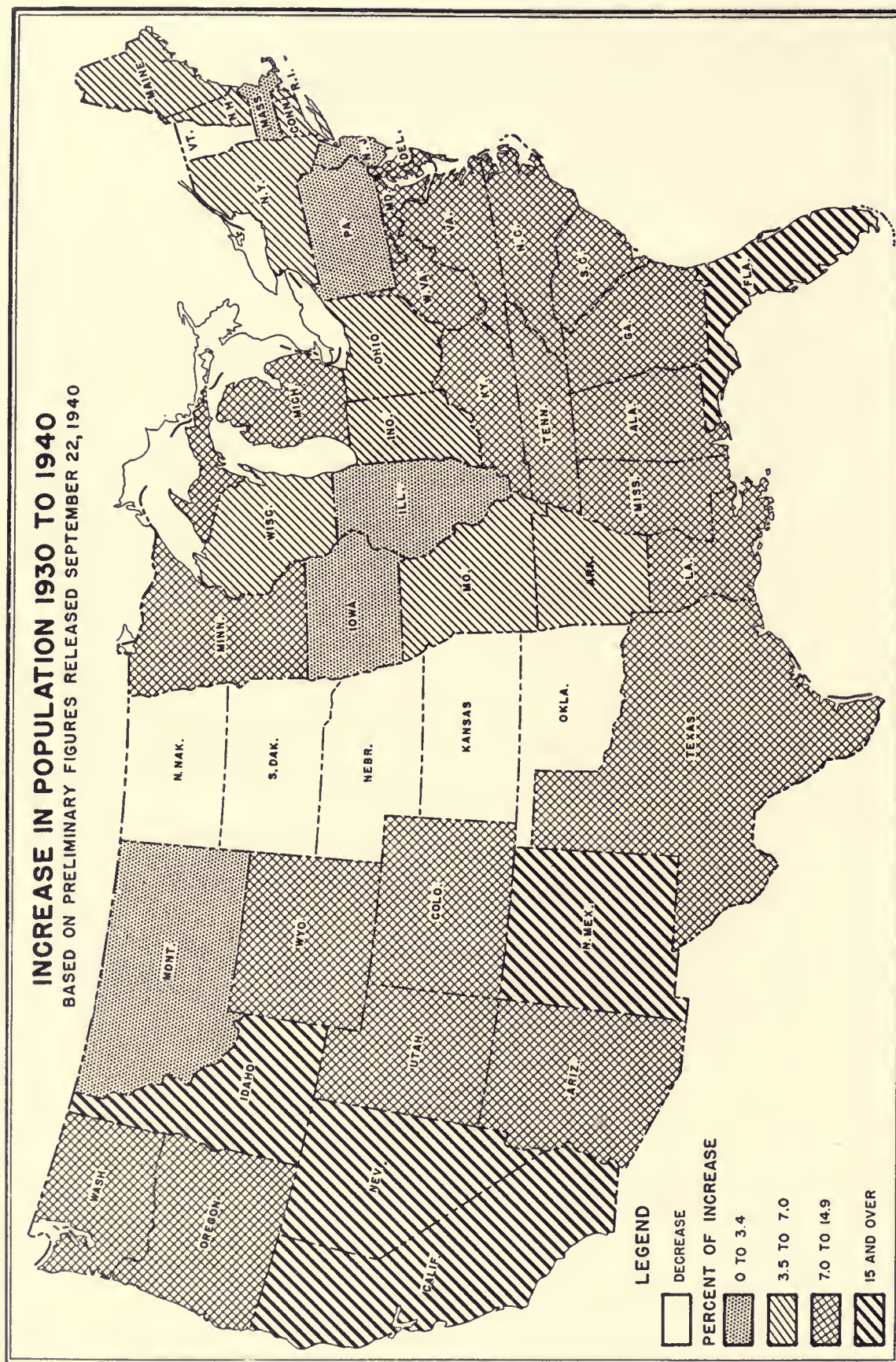


FIGURE 1.—Increase in population, 1930 to 1940

Prepared in office of the National Resources Committee

LETTER OF TRANSMITTAL

NATIONAL RESOURCES PLANNING BOARD

FIELD OFFICE

OMAHA, NEBRASKA

OCTOBER 28, 1940.

MR. CHARLES W. ELIOT,
Director, National Resources Planning Board,
Washington, D. C.

DEAR MR. ELIOT: In submitting this preliminary development plan or program for the Missouri Valley region, which includes the States served by the Omaha field office of region 6 of the National Resources Planning Board, we wish to call your particular attention to the following:

1. This is a compilation of ideas and thoughts from many minds representing a number of agencies, both State and Federal, as well as official and private individual opinions and advice. We wish especially to acknowledge the generous help and cooperation of the following: District Corps of Engineers, Soil Conservation Service, National Park Service, Forest Service, Bureau of Reclamation, Farm Security Administration, United States Housing Authority, Civil Aeronautics Authority, Fish and Wildlife Service, Bureau of the Census, extension services of the land-grant colleges, North Dakota State Advisory Board, South Dakota Resources Advisory Board, Nebraska State Planning Board, Minnesota Resources Commission, Kansas State Planning Board, Missouri State Planning Board, and the recently appointed Iowa Industrial Resources Defense Commission, as well as the water consultants of the National Resources Planning Board. We are especially indebted to the Montana State Planning and Water Board, the Wyoming State Planning Board, and the Colorado State Planning Board for effective collaboration on the drainage-basin plans of the upper Missouri and the Platte River Basins.

2. This is properly and of necessity a very flexible plan or series of suggested programs subject to change from time to time as conditions warrant and additional public and private opinion and advice become available.

3. One definite and immediate need if the plan for the region is to develop properly is the creation of an official Missouri Valley Planning Commission which could, with the necessary committees concentrating on *special* problems and problem areas, do much toward effectively mobilizing the best minds of the region toward their solution. The efforts of many agencies working out extensive programs in the various States could be focused through such a commission insuring better cooperation toward common objectives.

Incomplete as it may be in many phases of a comprehensive plan, it does, we feel, represent an encouraging example of helpful conscientious cooperation on the part of the many Federal and State agencies working with the Omaha staff and consultants of the National Resources Planning Board. It is our hope that it is but the beginning of a much more definite and detailed social and economic plan for this great region directed toward a stabilized, prosperous, and happy people engaged in those pursuits best adapted to the resources of the region.

Sincerely yours,

P. H. ELWOOD, *Chairman, Region 6.*

PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN MISSOURI VALLEY

PART I. INTRODUCTORY STATEMENT

The seven States of Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota comprise the area generally served by the Omaha regional office of the National Resources Planning Board.¹ In terms of location, these States occupy the north-central portion of the Nation; in terms of acres in farms, they account for 26 percent of the United States' total. In general, the area is flat to rolling, with significant exceptions along some of the water courses and in the Black Hills and Ozarks. Its soil grades from the best to very poor. It is a land of extreme cold and intense heat; a land with normal annual precipitation averages ranging from 15 inches in the northwest corner to over 45 inches in the southeast. Fortunately for agriculture, approximately 70 percent of it comes during the growing season. In terms of economic organization, agriculture and livestock are its main resources. In addition, it has significant amounts of iron ore, petroleum, natural gas, lead and zinc, gold and silver, and many other minerals, including manganese, lignite, and coal. Other resources are to be found, such as gypsum, ceramic clays, limestone, and forests.

The Missouri Valley Region

In the creation of a regional development program for the seven States of the Omaha field office, one is met immediately with an important question, namely, what is the common bond of these other States? In other words, do we have here a unified region by any acceptable definition? A study of the economic geography of the United States shows our region to include parts of five economic regions. Its extreme length extends from cotton in the bootheel of Missouri to grazing, mining, and lumbering at the Canadian line. What, therefore, is the common bond in region VI?

It is recognized at the outset that this question is neither new nor unique to this region. The problem of regionalism has been thoroughly treated in a prior National Resources Board publication.² In that publication are set out many types and kinds of regions as well as the limitations to any selected basis, especially one along State lines. Yet for all these difficulties, these

seven States are a logical combination for regional development.

In the first place, there is a common bond in the Missouri River Basin. Every one of these States has some degree of interest in the maximum use of the waters of that river. In the second place, this group of States has a socio-economic homogeneity—it lies in that trans-Mississippi area bordered on the east by a great river and on the west by the Rocky Mountains. From Davenport, Iowa, to its most westwardly village, one is constantly reminded that he is “out where the West begins!”

In the third place, there are at least two common economic ties. The first of these is the Great Plains stretching north and south across the western half of this region. From this area comes the livestock that is fattened in the western Corn Belt, i. e., Iowa, Nebraska, and southeastern South Dakota. Thus, there is an economic interrelationship, which, when balanced, unites the Plains to each of the other States of the region. A second economic tie is the strategic location in the matter of industrial development. These States lie directly in the path of the westward expansion of industry. In these days of hurried defense activities, the industrial possibilities of the region have become very important. Its combination of interior location, adequate transportation, and abundant resources ought to make for significant defense and peacetime expansion.

In the fourth place, region VI has the virtue of including not one, but several problem areas. It is a region “based on a composite of problems.” Thus, the energies of its leaders will not be focused excessively on a single situation. Instead, in the consideration of several major problems, there will more likely be created a genuine regional program properly balanced by all relevant economic and social considerations. Finally, for administrative convenience, the States of region VI are a proper grouping. With minor exceptions, there is scarcely an important city in the region not quickly accessible from the regional office in Omaha.

The Need for a Regional Plan

There are many reasons why there must be regional planning: We are in the process of closing a three-century long epoch of planless exploitation of the human, natural, and physical resources of North America.

¹ Since part of the work of the drainage basin committees of the Missouri River is administered by the offices in Omaha and Denver, our office can be said to serve jointly with region VII (Denver field office).

² National Resources Committee, *Regional Factors in National Planning*, 1935.

During these three centuries, it has been assumed that untrammelled individual initiative would somehow yield the greatest long-run social progress. Now we know the error of that assumption. In the haste to satisfy immediate needs, we have cut down our forests, destroyed much of our wildlife, wasted our precious soil and mineral resources. Only today are we reckoning the toll of these past practices. If we are to secure a proper balance in the use of our resources, there must be intelligent planning and action in accordance with those plans. In the area of region VI, for instance, we must learn to put our scant water supplies to the most beneficial uses, we must execute the best available of land-use patterns, and we must use our dwindling mineral supplies as economically as possible. In short, the practices of the past compel the immediate formulation of regional and national plans. Not to do so now may lead to disaster not many years hence.

We can be specific in this matter. As a result of "planless" exploitation, we are now faced with several serious problems. Looking first to the eastern side of region VI, there are the exploited mineral and timber areas in Minnesota and Missouri. In Minnesota there has been a double stage of exploitation. First the land was quickly stripped of its trees; then it was robbed of its scant fertility by an exploitive agriculture. The results are a denuded and eroded topsoil and, at best, a meager existence for its owners. As a result of the recession of these waves of exploitation, we have inherited the social consequences of stranded populations and abandoned lands. A similar problem exists on the Minnesota iron ranges. There, changes in mining methods have eliminated jobs for many miners, thereby leaving stranded population areas. The same general picture, with minor variations, applies to the Ozark area of Missouri. There, a stabilized subsistence mountain agriculture has twice been invaded by cycles of exploitation. First, it was lumbering; next, it was mining. As a result, there has been the usual aftermath—a disorganized economic and social pattern, abandoned lands, stranded populations.

Even the more level agricultural prairies stretching between the Minnesota forests and the Missouri Ozarks have not been immune from the devastating effect of exploitation. Improper agricultural practices have speeded up water erosion and exhaustion of land. For instance, in some of the more rolling parts of Iowa and Missouri, as much as 75 percent of the topsoil is now washed away. As a result, not only has the eventual abandonment of lands been hastened, but the river streams of that area are rapidly becoming "aquatic deserts."

Turning to the western half of region VI, we find one of the major rural problem areas of the United States. There, beyond the ninety-eighth prime merid-

ian and stretching westward to the Rockies, lie the Great Plains, an area of broad expanse broken only occasionally by rivers and gullied lands, a region of high winds, intense sun, and little water. Here, the usual land-water relationship is reversed. Instead of attempting to carry away surface water as rapidly as possible, the problem becomes one of intense water conservation. Over almost all of the area of the Great Plains normal precipitation approaches (or falls below) the critical point of humid agriculture, and in drought years the results are disastrous. In 1934, a drought year, 7,500,000 acres of corn were planted and not harvested, and approximately 20,000,000 acres of wheat were lost. The former was one-eighth of the United States' total of acres planted in that crop; the latter was one-half of the total number of acres planted.

Space does not permit a detailed review of the history of the settlement of the Great Plains.³ In brief, these areas were settled according to the small-homestead pattern of eastern humid agriculture. A combination of better-than-average rainfall in early years and high prices during the first World War caused excessive plowing of these range lands for wheat raising. Even where the plow did not penetrate, overgrazing led to the same consequences. Soon, the Great Plains were exposed to the fury of wind and water.

The consequences are easily (and tragically) recorded. After years of drought, many farm families have given up the fight, moving to a nearby town or migrating to other regions—mainly toward the west coast. This movement can be shown statistically. In the decade 1930-40 the Plains States each lost the following population:

	Loss in population	Percent of 1930 population
Kansas.....	91,862	4.9
Nebraska.....	64,495	4.7
North Dakota.....	41,155	6.0
South Dakota.....	52,877	7.6

These figures do not show the real losses because they should be adjusted for increases in urban places and for the general growth trend in the United States. So adjusted, these four States will have relative declines of approximately 10 or more percent. When one examines the data for each State, he finds county losses ranging to a high of 64.2 percent for Buffalo County in central South Dakota.

Another evidence of distress on the plains is seen in the figures for tax delinquency. In a 1940 study sponsored by the State advisory resources board and the Tax Commission of North Dakota, 18.8 percent of

³ For brief, but excellent statements, see Report of the Great Plains Committee, *The Future of the Great Plains*, 1936; National Resources Planning Board, *Northern Great Plains*, 1940; Bennett, *Soil Conservation*, ch. 35, especially pp. 733-738, 1939. For a more extensive treatment, see Webb, *The Great Plains*.

all land in that State was found to be 5 or more years' tax delinquent. If to this are added the publicly owned lands, 30 percent of North Dakota pays no taxes. Of course, certain counties show a far worse situation. In an extreme case, one county has over 40 percent of its farm lands with 5 or more years' taxes delinquent. Other States show similar results. Carelton County in the Minnesota cut-over area has had 23 percent of its acres revert to the State because of delinquent taxes. To this should be added another 20 percent in some stage of tax delinquency. Our last sample is in South Dakota. In Stanley County, in the center of the State, where rainfall averages are most critical for dry farming, 65.3 percent of all farm land in 1938 was tax delinquent and 57.8 percent subject to tax deed. The picture is scarcely better in other South Dakota counties. Corson in the northwest corner had 70 percent of its land delinquent and almost half subject to tax deed.

The consequences of such delinquency are generally to demoralize county government and to shrink the tax base, thereby increasing the load on taxpaying property. Even here there are definite limits to tax increases.

A third evidence is the record of relief. We illustrate with data from North Dakota. For the State as a whole, 34 percent of the population was on relief in 1937, 31 percent in 1938, and 21 percent in 1939. Again, when county figures are examined, the percentages run to a high of 68 percent in 1937, 76 percent in 1938, and 41 percent in 1939. Such figures far exceed the national average of approximately 15 percent of the population on relief.

To this point, we have presented the need for regional planning in terms of the larger subdivisions of the region, viz, the cut-over portion of Minnesota, the Ozark portion of Missouri, the western portion of the Corn Belt, and the Great Plains. There are, in addition, several smaller areas, which within their borders present equally important problems of rehabilitation and reorganization. In South Dakota is a large area of land containing the chemical element selenium. It is poisonous to man and beast and, unfortunately, is absorbed by all forms of plant life growing on selenium lands. Thus, animals grazing on or fed with forage or grain from such areas often develop a serious disease usually referred to as alkali disease. In turn, the meat of these animals will infect any who eat it. As a consequence, the agricultural use of selenium lands has become quite hazardous.⁴ In Missouri there is the boot-heel section with the problems attending cotton culture, and the stranded population in the tiff section on the eastern side. In southern and central Iowa there are the stranded coal-mine

communities. In Kansas there is the gas and oil section where, at the present time, a goodly portion of the gas is wasted. In Minnesota there is the problem of unemployment on the iron ranges. In Kansas there is the salinity problem, one which arises from search for sub-surface water and improper irrigation practices. Finally, each of these sections is a problem area, and for each some careful planning is necessary.

The Resources for Planning

We have set out the area of region VI and its problems. To correct these problems, we need extensive plans for the maximization of water use and the conservation of mineral and land resources for the ultimate benefit of the largest number of people. As we show later on, the attainment of these objectives can come only through official local, State, and regional planning organizations. But before we can plan, we must know the economic and social foundation upon which plans must be built.

1. Land (Agriculture)

Our primary economic resource is land, especially agricultural land. The percentage of total land area in farms ranges from 63 percent in Minnesota to 96.6 percent in Kansas. The four Great Plains States have approximately nine-tenths of their area in farms. This farm land is used generally for the growing of crops and the feeding of meat animals. Thus it will be no surprise to find that this region is one of the two primary food-producing areas of the United States, raising from 40 to 45 percent of all United States food production. The following table illustrates this point:

<i>Percent of United States production</i>	
Wheat.....	53
Corn.....	44
Small grains.....	54 to 65
Hogs.....	36
Cattle.....	28

Only one important natural hazard stands in the way of the proper agricultural utilization of all but the roughest portions of this region, and that is water. In the western half (past the ninety-eighth prime meridian) the average annual precipitation approaches, and falls below, the minimum requirements for humid area agriculture. In drought years, the actual rainfall for all this section may be below that critical point. Thus, for this Great Plains section, the first requirement for agriculture is water. The first step in a balanced economy for this section must be the maximum economical development of water facilities in combination with a land-use program intelligently related to available water supplies.

Of course, other hazards of natural and man-made varieties exist. Pests, improper farm practice, im-

⁴ This problem has been given special attention by the South Dakota State Planning Board in its report *Selenium Problems in South Dakota*, Brookings, 1937.

proper farm size and organization, and unpredictable price oscillations are but a few. But the proper integration of regional and natural plans can meet all these.

2. Land (Mining)

The second significant resource of the region lies under its surface—minerals. These range from the most important such as iron ore, lead and zinc, and petroleum and natural gas, to isolated deposits such as tuff and gypsum, to a host of minerals of yet unknown or doubtful commercial value. While mineral production is distinctly second to agricultural production, being but approximately one-eighth of the latter in a normal year, it is nonetheless important to the region and to the United States. This is shown in the following table:

Percent of United States production

Mineral:	
Iron ore.....	63
Gold.....	22
Lead.....	35
Zinc.....	17
Lignite.....	¹ 65
Bituminous coal.....	¹ 10
Petroleum.....	5
Natural gas.....	3

¹ Percent original reserve.

Since the region has been one primarily devoted to agriculture, its mineral deposits, worked and potential, may be a basis of future stabilization of economic activity. As Father Ligutti has demonstrated at Granger, Iowa, mining is one occupation that can be integrated with a type of part-time agriculture, especially where productive land is available.

3. Manufacturing

Any region that raises foodstuffs and produces minerals is likely to have a certain type of manufacturing. Unless transportation rates are too adverse, at least the early processing stages will be located near the source of raw material. In this respect, except for iron ore, every significant raw material of the region is processed to some extent in the region. The leading industries thus include flour milling, cereal milling, meat packing, and oil refining. The importance of some of these is shown below:

Percent of United States production

Manufacture:	
Flour.....	39
Butter.....	45
Meat packing.....	31
Poultry.....	52

In addition, there are many more kinds of manufacturing, ranging from fountain pens in Fort Madison to airplanes in Wichita. In short, while distinctly third in the economic pyramid of region VI, these industries are essential, especially to a well-balanced economy. Properly planned and developed, they will assist in absorbing some of the region's unemployed. Considering its natural advantages in the form of labor, markets, and resources, unless freight rates interfere,⁵ there ought to be significant future industrial expansion.

4. The People

Farm lands, minerals, and to some extent, manufacturing establishments are but the inert raw materials out of which people build themselves a society. Thus a final ingredient is essential—people and particularly, intelligent people. That this region possesses this element is scarcely open to debate. It was intelligence that made possible the opening and development of the West. And now where ignorance and carelessness have created problems, it will be intelligence that will find their solution. Thus, we have the essential base for a proper social pyramid. Upon such a foundation can be built a superstructure of many dimensions. Such an edifice built with intelligence upon a balanced economy can include all those things essential to the well-being of the people of the United States. In short, on such a social and economic base as exists in region VI, real and effective plans can be prepared by which to accomplish what now appear to be but roseate dreams.

Limits to Regional Planning

Without wishing to detract in the least from our plans for regional programming, we must be realists enough to admit that there are limits to regional planning. In many instances a regional program will require interregional and national direction. For instance, if the economic balance of the Great Plains should require significant migration of people, such a plan becomes a national one. In other ways regional planning is limited. A complete solution of the farm problem may demand the stabilization of the prices of farm products, and certainly in its broad objectives and operation it requires national supervision and organization. This would be a very difficult task for regional planners acting alone. Thus, just as regional plans attempt to integrate and implement local and State plans, so must regional plans be related to each other, and made complete through national planning.

⁵ The Interterritorial Freight Rate Problem of the United States. A study of the Tennessee Valley Authority, printed as H. Doc. 264, 75th Cong., 1st sess.

PART II. THE REGIONAL PLAN

What combination of specific plans are best adapted to (a) give to these States a balanced economy and (b) create for the United States a balanced interregional economy? Specifically, what can be done to improve the economic and social environment of the people in this region, stabilize employment, reduce to a minimum the relief load? To this end, the following nine objectives are presented. They are the result of composite efforts of many authorities and cooperating State and Federal agencies. Action programs along the lines set out below, while they cannot prevent drought nor eliminate other natural disasters, can make such events less destructive, and withal, begin to give a more stabilized population pattern.

Water Resources**Missouri Drainage Basins**

Problems and Objectives.—An adequate water program must include the profitable use and conservation of all water resources, surface and underground. In this plan all types of use—urban, rural, and recreational—should be considered. The important problem in the Missouri Basin is scarcity of water relative to the demands of various types of possible uses.

The principal objectives involved in a comprehensive program of reorganization of water supplies of the Missouri Basin are: the adjustment of the Missouri headwaters' supplies above Canyon Ferry; the equitable allocation of the waters of the interstate tributaries of the Yellowstone; the development of the meager water supplies of the Great Plains tributaries; the early determination of a general policy concerning priority in use of the main stream and tributaries (e. g. navigation versus other uses); the adjustment of controversies and allocation of waters of the Platte; further studies of transmountain diversions from the Colorado; the correlation of multiple uses on the Republican and other Kansas River tributaries; major storage for flood control, navigation, and other purposes on the Kansas, Osage, Grand, and Gasconade Rivers; tributaries to the lower Missouri; and determination of extent of pollution and its abatement on the Missouri from Sioux City to the mouth.

The following recommendations are intended to give the present status of the investigations and the plans being made by the various Federal and State agencies, and to suggest procedure that will lead to a reasonable coordination of the efforts of all concerned.

Recommendations.—

1. Adjustment of Missouri headwaters' supplies above Canyon Ferry, Mont.: The Montana Power Co. has for a number of years operated a series of power plants extending downstream on the Missouri from

Canyon Ferry, a few miles due east of Helena, to a point well below Great Falls. These have made complete utilization of the low flow, augmented by pondage in the various reservoirs on this section of the main stream and by storage from the Hebgen Reservoir far upstream.

Proposals for the extension of irrigation and storage for existing irrigation projects in the headwaters above Canyon Ferry have led to threats of litigation, but within the past year a constructive program has been initiated. The Montana Power Co., the State of Montana, and the Bureau of Reclamation have entered into a three-party agreement for investigation and adjustment of conflicting interests.

The plan under investigation contemplates the construction of a storage reservoir of about 1,000,000 acre-feet capacity at Canyon Ferry (the head of the power system) in which will be impounded surplus waters that have hitherto flowed unused past the power stations at certain times of the year. This storage will be released to the power system when required in exchange for upstream storage and freedom to make diversions for consumptive use in the headwaters of the basin above Canyon Ferry. The project should facilitate the readjustment of water supplies to existing systems and will permit the extension of irrigation to other areas. It is of greatest importance, and it is probable that an equitable adjustment satisfactory to all concerned will be secured.

Interchange of power between plants to be constructed in the future on the Yellowstone and the Missouri River system may later play an important part in the plan for development of Missouri headwaters, and has been suggested as an item in the adjustment of existing rights.

2. Adjustment of interstate controversies on the Yellowstone tributaries: Under recent legislation, there has been reestablished the interstate Compact Commission on the adjustment of controversies on the Yellowstone. The Commission is composed of representatives from the States of Wyoming, Montana, and North Dakota, and a representative of the United States Government (Mr. Clyde Seavey, Commissioner, Federal Power Commission). The Commission will undertake to reach an agreement that will provide for the equitable allotment of waters of the Yellowstone tributaries, namely, Big Horn, Tongue, and Powder Rivers, among the conflicting interests of the various States.

The large amount of information collected by the Commission under its previous authorization, and the very extensive additional studies that have been made in the basin in the last 2 years by the Corps of Engi-

neers, the Bureau of Reclamation, the Soil Conservation Service, and the Forest Service jointly, and by some of the State authorities, should make it possible for the new Commission to reach its findings within the next 2 or possibly 3 years. Its decision will have a very definite bearing on the storage required for regulation of the principal tributaries and the effect on the Yellowstone and Missouri. On these items, the future development of the region largely depends.

3. Coordination of the plans of the Bureau of Reclamation and the Corps of Engineers for development of the Yellowstone and tributaries: The Corps of Engineers has recently completed a report on the regulation of the Yellowstone tributaries for flood control, navigation, and other purposes. This document is under review by the Board for Rivers and Harbors and has not yet been released. The Bureau of Reclamation study of the best plan for development of the Big Horn and other tributaries is now well along toward completion but, as in the case of the preceding report, has not yet been released.

Although neither of these reports has yet been made public, it is understood that the respective plans advocated for storage regulation (particularly on the Big Horn) are not as yet in entire accord. This regulation will play a very important part in the adjustment of the water supplies of both the main stream and its tributaries and will be of vital interest to the Interstate Compact Commission in determining how the supplies are to be utilized and allocated between the divergent interests. Determining the best plan for the river will, in any case, require an adjustment of these two plans, and expediting their correlation will expedite the final report of the Interstate Commission. In the meantime, the final plan for the utilization of the waters of the Yellowstone (and also all of the upper Missouri with which the Yellowstone is intimately connected) cannot be definitely determined.

4. Development of the Great Plains tributaries: An economically justifiable general development of the relatively meager and notably erratic water supplies of the Missouri tributaries from the central part of the northern Great Plains presents a very difficult problem. These streams, from the little Missouri to the Platte, include the Knife, Heart, Cannonball, Grand, Moreau, and Cheyenne Rivers. Progress has been made toward proposed developments on the western border of this area, including the Angostura project, Rapid Valley-Pactola Reservoir, and Mirage Flats project. Other items in the program are the pumping projects along the main Missouri, on the eastern boundary of the area. The possible ultimate development in the Great Plains area lying eastward of the Black Hills still remains to be determined and presents, on account of the erratic flow of the streams and economic limitations, a very

difficult problem. The final plan will depend upon the outcome of studies now being made, particularly by the Bureau of Reclamation and the Bureau of Indian Affairs.

Even the more attractive and feasible projects already taken up in the Great Plains program have involved a considerable allocation from Federal funds on a non-reimbursable basis. Future projects within the problem area in question will probably require even larger proportionate nonreimbursable allotments. The projects will probably not be justifiable on the basis of return from the lands directly affected, but must depend for justification on their bearing on the general readjustment of use for far larger contiguous areas.

5. Early determination of a general policy concerning priority in the use of waters of the Missouri River: Recent studies have further emphasized the potential conflict between navigation and other uses of the Missouri main stem and its principal headwater tributaries. That an early determination of policy is imperative is made clear by the studies of the past 2 years.

The situation on the Missouri is not unique, but parallels that which has led to unending controversy on the Arkansas and on the Platte. On the Missouri, however, the downstream use is navigation instead of irrigation. Briefly, construction of Fort Peck Reservoir was undertaken for the purpose of regulating the discharge of the Missouri for navigation by providing an estimated discharge of 30,000 cubic feet per second during the navigation season at Yankton, S. Dak.; training works were also to be constructed on the main stem below that point. Both the reservoir and the training works have been constructed, and it has been found that the training works have produced more beneficial effects than had been anticipated but that the regulated supply at Yankton during a dry cycle such as that of the last 10 years will be only about one-half that originally estimated (17,600 cubic feet per second, as compared to 30,000 cubic feet per second).

Further, other potential uses of the river now planned show vastly greater probable depletion of its flow than was anticipated when the Fort Peck project was initiated as an aid for navigation. Among the proposed uses that would further decrease the diminished water supply available for navigation are the possibilities of irrigation of many thousand acres in the headwater tributaries above Canyon Ferry, possible irrigation of some 500,000 acres below Canyon Ferry and above Fort Peck Reservoir, and the development through reconnaissance of a potential irrigable area of over 1,700,000 acres below Fort Peck, from part of which the return flow would not discharge back into the Missouri drainage.

While it is not to be anticipated that all of these potential areas will ever be irrigated, it is probable that a substantial percentage thereof may be utilized, providing a firm title to an adequate water supply can be secured. All such developments would be in direct competition with navigation, as would further development on the Yellowstone and tributaries, and many smaller developments throughout the upper basins, already proposed by Montana and Wyoming but not included in the above list.

The Federal and State departments now engaged in the study, construction, or operation of certain types of development are well justified in striving to protect their rights to the use of water, until such time as a general policy covering the limited supply is established by mutual agreement or by court decision. The Corps of Engineers, for example, has been placed, by act of Congress, in charge of construction operation at Fort Peck Reservoir primarily for navigation and is not in a position to accede to the utilization of Fort Peck water supplies for other purposes detrimental to navigation. The Bureau of Reclamation, in the same manner, cannot be expected to refrain from operating or developing its projects in the upper basin to protect navigation on the lower stream.

Definite action must, therefore, be taken to apportion equitably the water supplies that are available or that may be made available through further storage. The determination of this policy ties in directly with the work of the Yellowstone Compact Commission and with the adjustment of the storage and development programs of all Federal and State agencies.

Navigation on the main stem will be but little affected by any development that can be made in the central Great Plains tributaries east of the Black Hills.

6. Adjustment of differences in the Platte Basin: The supplies available in the basins of the North and South Platte have been intensively utilized for many years, both by natural diversion and through the construction of extensive storage, particularly on the North Platte. Conflicting claims have led to many court proceedings and there is now pending the important litigation between the States of Nebraska and Wyoming, involving also the State of Colorado, regarding the uses of waters of the North Platte. Unsuccessful attempts have been made to have this litigation held in abeyance, pending a thorough investigation of the water supply and the reaching of an agreement by stipulation or compact. These efforts have been unsuccessful, and the case is proceeding in the courts. Unless there is a change of policy, which does not now appear probable, the ultimate adjustment of water supply from the North Platte will depend on the outcome of this case.

Construction of the Kingsley Dam on the North Platte in connection with the Tri-Counties Public Power and Irrigation District should go far, however, to adjust the flow of the North Platte and main Platte below that point and to facilitate adjustment of conflicts that might arise on that part of the stream.

7. Further studies of transmountain diversion from the Colorado: Large transmountain diversions from the Colorado River Basin will be made available through the construction of the Colorado-Big Thompson project, and other diversions from the same source have been studied; these include possible transmountain diversions into a portion of the basin within Wyoming. The ultimate conclusion of these studies is still to be reached, but it is probable that any additional diversions will be smaller than that through the Colorado-Big Thompson project. All of these diversions, if in compliance with the Colorado River compact, deserve careful study.

8. Regulation of multiple uses on the Republican and other Kansas River tributaries: Multiple-use projects on the upper Republican River have recently become involved with storage long proposed for flood protection of the Kansas cities—one of the most important flood-protection projects in the Mississippi River Basin. Studies of the Kansas cities' problem eventually resulted in the selection of large storage at the Tuttle Creek site on the Big Blue near its mouth, and at the Milford site on the Republican near its junction with the Smoky Hill to form the Kansas, to reduce the Kansas River floods within local levees of moderate height at the Kansas cities.

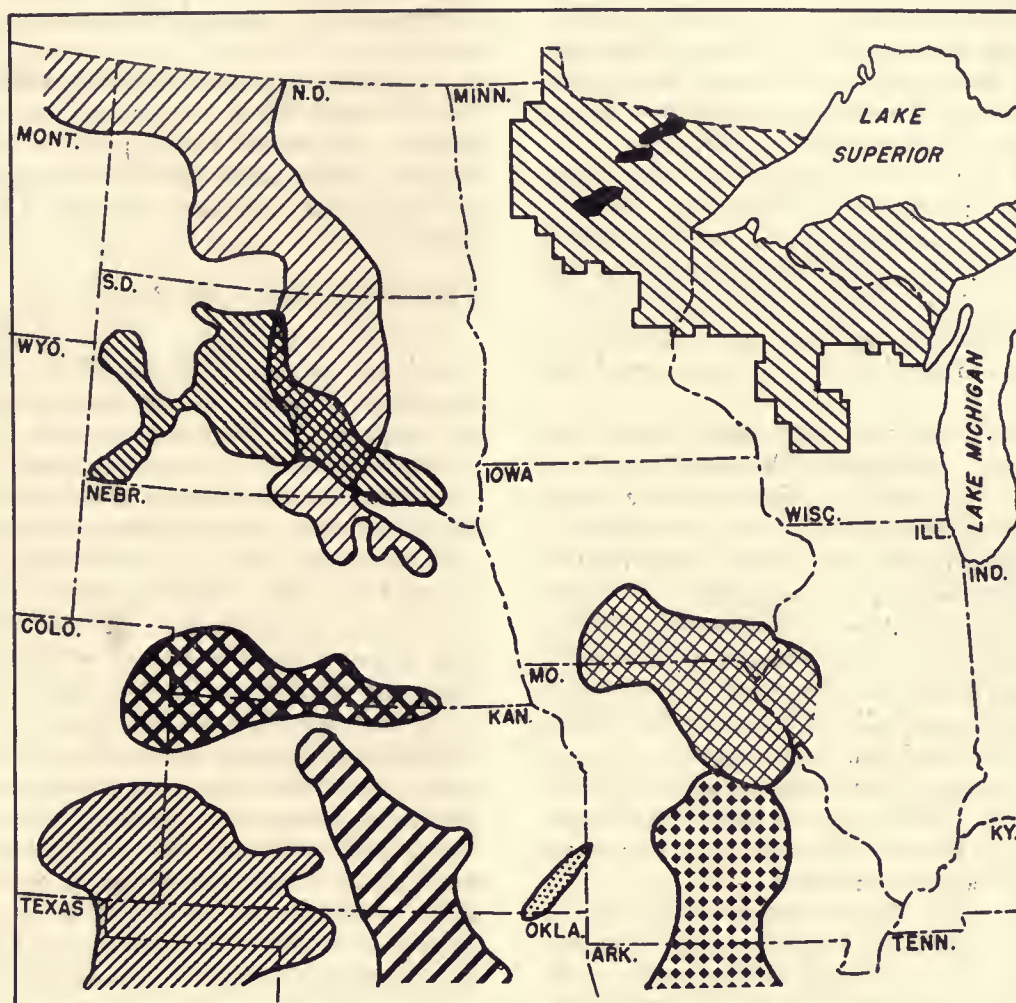
Local opposition developed against the use of the Milford site, and the protestants proposed to move the storage upstream to Scandia, Kans. Later, under studies authorized by Congress, the Scandia site was studied, but the Harlan County Reservoir, still farther upstream, was finally selected as a substitute for Milford.

The decision to locate the main storage on the Republican at the Harlan County site, in its turn, drew fire of local interests still farther upstream. These protestants advocated construction of a system of five or six reservoirs on the principal Republican tributaries above or to the westward of the Harlan County site. At first they advocated the abandonment of the Harlan County project in favor of the system of smaller storage reservoirs; later, they favored construction of a system of small reservoirs in addition to the Harlan County Reservoir.

Correlation of flood protection by the Harlan County Reservoir with irrigation downstream, and possible correlation of proposed upstream flood-control storage with irrigation, are still under study. In fact, the entire development of the Republican is still under study and

SPECIAL PROBLEM AREAS

NATIONAL RESOURCES PLANNING BOARD REGION 6



LEGEND

	STRIP COAL MINES		REPUBLICAN RIVER
	CRITICAL NORTHERN PLAINS		OZARKS CUT-OVER
	NORTHERN LAKE STATES CUT OVER		SELENIUM
	ERODED HILLS		DUST BOWL
	OIL AND GAS		IRON ORE RANGES

FIGURE 2.—Special Problem Areas

Figure 2 presents the generalized boundaries of several special problem areas found in Region 6. Such a map must be used with caution, because not every acre within a given problem boundary is necessarily affected. The selenium area, for instance, appears to cover about a quarter of the State of South Dakota. As a matter of fact, within that boundary are many acres free of selenium. Therefore, the boundary as shown simply means that within its borders is to be found such selenium infected lands as are known to exist.

should be carefully analyzed, there being some doubt as to how far eastward irrigation is required, and will actually be utilized, under ordinary climatic conditions.

Further study is also in order to make sure that adding 4,100 square miles to the unregulated drainage area above the Kansas cities by moving the reservoir upstream from the Milford to the Harlan County site will not unduly reduce the protection to the Kansas cities. It has been determined that this move can be made, but further review may be in order.

Elsewhere in the Kansas Basin—on the upper tributaries of the Smoky Hill, Solomon, and Saline—irrigation possibilities are being studied by the Bureau of Reclamation and by the Corps of Engineers in connection with a review of its original "308" report. Final plans for utilization of the upper reaches of these streams will depend upon the outcome of the studies.

9. Flood-control and multiple-purpose projects on the lower Missouri tributaries: Construction of an extensive system of storage projects on the lower Missouri tributaries has been considered, from time to time, for local flood control and for the regulation of the Missouri and Mississippi for navigation. In addition to the Milford and Tuttle Creek Reservoirs already mentioned, the group of reservoirs selected included the Osceola, South Grand, and Pomme de Terre projects in the Osage Basin; the Chillicothe in the Grand River Basin; and the Richland and Arlington Reservoirs in the Gasconade Basin. In connection with the Gasconade Reservoirs, there is an excellent opportunity for development of power. Irrigation is not involved on these lower Missouri tributaries.

Local flood regulation is particularly needed on the Grand, and the Chillicothe Reservoir would alleviate a very serious condition that has been brought about by the uncoordinated plans of various drainage districts.

10. Determination of the extent of pollution and its abatement on the lower Missouri: Serious pollution exists at various points along the Missouri River, resulting chiefly from manufacturing and packing-house waste and from sewage. The extent of pollution and its direct effect on health in general, and particularly on the water supplies of various communities, cannot be determined without a study that has been proposed and may be undertaken at an early date. The section of the river to be included in this investigation extends from Sioux City to the mouth. A preliminary reconnaissance would determine definitely what intensive studies are required and the best methods of procedure.

11. All States in the region should immediately pass laws for the purpose of controlling and regulating the use of artesian water. In those States that already

have enacted such laws, proper procedure for execution should be developed.

12. Irrigation development in the northern Great Plains should be provided primarily to increase the stability of farmers and ranchers already operating within a given area rather than to add new operating units.

13. Appropriations should be continued to complete the Missouri River navigation project, in order to protect completed works, preserve temporarily stabilized riparian lands, and insure early commencement of commercial navigation to Sioux City. (See No. 5 above.)

Upper Mississippi Drainage Basins

Problem and Objective.—The principal problem involved in the upper Mississippi River drainage basins is the development of the most economical plan for the removal of flood-flow hazards from the stream valleys of the tributaries of the upper Mississippi. In the subhumid and semiarid areas careful consideration should be given to possibilities of including in the flood-control works facilities for making irrigation water available to areas where agriculture without water is hazardous and uncertain. This plan should take fully into account the possibilities of flood-flow reduction that may result from the ultimate and most economically desirable plan of land use and management. It should also take into account possibilities of flood-flow reduction through the installation of small upstream engineering structures useful for the protection of the upper reaches of each basin. It should also include an analysis and determination of the extent to which large water storage or detention projects located in the lower reaches of the tributaries may be beneficial or objectionable locally as compared to any alternate water plan for these tributaries.

Recommendations.—1. The important need of the Red River of the North drainage basin is the conservation of the available water supply and the regulated release of the conserved water for beneficial use as domestic water supply for the Red River cities and for the dilution of wastes. In this basin, a reasonably comprehensive water plan was prepared in 1936. Since that time, further investigations have been made, additional information is being collected, and the need for other quantitative data has become apparent. A complete review of the water plan for the Red River of the North should be undertaken in the light of new information and a further understanding of the problems.

2. Treatment of domestic and industrial waste waters to the greatest extent economically justified for the maintenance of water quality in the Red River and its principal tributaries.

3. Reasonable provision for the control of flood waters to reduce flood hazards for both urban and agricultural lands in the Red River Basin.

4. In the Rainy River Basin, water planning must be focused on the best adjustment of lake levels as between the conflicting uses of water-power development in the vicinity of International Falls and the preservation of relatively stable lakes for recreation and wildlife.

5. In the Souris River Basin, the problem is similar to that of the Red River of the North, except that the major object of water conservation is related to the interests of wildlife, with, however, due regard for urban requirements. A second consideration involves utilization of conserved water to the extent possible for supplementary irrigation.

6. In the upper Mississippi "D" basin, the general needs are further detailed adjustment of the upper Mississippi navigation project to other land and water needs in the area adjacent to the Mississippi River; reduction of flood hazards with respect to the flood plains of the tributary streams in the region; the best adjustment of other water needs and uses to projects for the conservation of wildlife along the Mississippi itself; and a further study of the problem of the main Mississippi Valley from the public health aspect, to the end that the reentry of malaria into this region may be avoided to the greatest extent possible.

7. The important needs in the upper Mississippi "E" basin involve a satisfactory completion of the upper Mississippi navigation project through and below the St. Louis industrial region; the completion of adequate flood protection for this region against the maximum expected floods of the Mississippi River; the development of recreational uses for the pools of the Mississippi navigation project; and an adjustment of the operation of this project in the best interests of wildlife.

With respect to the smaller streams in the upper Mississippi "B" basin, the water plan should provide adequate measures of flood-flow reduction on the Salt, Fabius, and similar streams of northwest Missouri. For the Meramec River, the ultimate water plan will revolve around the best use of this basin for recreational facilities related to water. As a corollary, this will involve considerations of wildlife conservation, reduction of flood frequency; the reduction in the number of silt laden minor floods; the steps necessary to preserve the quality of the Meramec River water for recreational uses, and to insure a safe supply of satisfactory drinking water for both the recreational population and the smaller communities of the basin.

8. Full consideration should be given to the conservation and protection of wildlife and the development of water for recreational use in all basins of the upper Mississippi River.

Land use

The Problem

Region VI is first and foremost an agricultural region; therefore, its primary concern must be with proper land use. Land must be classified by soil type, slopes, etc., and its use must then be adjusted to such natural phenomena as floods, droughts, and winds, and such man-made forces as changing food habits and oscillating prices. When all these factors are thrown into balance, there is some ideal use or uses to which every acre in the region may be assigned, such as farming, grazing, forestry, recreation, or wildlife.

The dominant land use in region VI is agriculture and livestock raising. Many Federal and State agencies are now planning with local representatives for the best use of farm land. The leading agencies in this field are the Soil Conservation Service of the Department of Agriculture, the Bureau of Reclamation in the Department of Interior, the Farm Security Administration, and the agricultural colleges, and their experiment stations and extension services.

The program of the Soil Conservation Service will illustrate one important phase of this work. That agency is concerned with the prevention of wastage of soil and moisture resources on farms, grazing, and forest lands, and the restoration of a permanent stabilized agriculture. Its program of action includes: Cooperation with soil-conservation districts, acquisition and management of submarginal lands, operation of demonstration farms, development of farm forestry, development of water facilities, and studies of flood control (in cooperation with the Corps of Engineers).

Because of its importance in land-use planning, we present a brief summary of its work. It has been found that land planning best begins where plans must eventually be applied—with the farm and farmers. As a result, the soil conservation district, organized under State law, is the primary land-use planning unit. In 1940, there were 3 such districts in operation in Wisconsin, and 10 others organized or contemplated. In Iowa, none was in operation, although 24 were contemplated or had been partially organized. In North Dakota, South Dakota, Nebraska, and Kansas, the record was 49 districts in operation. The following table presents the figures for the States of the Northern Great Plains:

Soil conservation districts

State	Districts	Original acreage	Acres added	Present total acreage
Nebraska.....	18	1,956,559	191,199	2,147,758
North Dakota.....	10	4,037,382	391,680	4,429,062
South Dakota.....	10	1,651,444	491,693	2,143,137
	38	7,645,385	1,074,572	8,719,957

Source: Information by Soil Conservation Service, Lincoln, Nebr.

As stated above, many new districts are planned within the next 2 years for Wisconsin and Iowa (Missouri now has no district law). In the Great Plains States of the Dakotas and Nebraska, 15 districts have been organized in the past fiscal year (July 1, 1939, to June 30, 1940). "Based on this rate of increase, it is anticipated that approximately 150 districts will be formed (in these States) during the next 6 years." This will mean a growth for these States of districts to an average of 600,000 acres each (236,761 at present). Eventually, when these States are completely organized, there will be some 330 soil conservation districts.

A second activity of the Soil Conservation Service, since it was assigned the task in 1938, is the management of the submarginal land projects of the Department of Agriculture. The figures for the three Northern Great Plains States are—

State	Number projects	Acres included	Acres purchased	Acres transferred from public domain
North Dakota.....	5	2,985,700	978,373	
South Dakota.....	5	1,998,800	798,748	52,550
Nebraska.....	1	510,080	131,022	
	11	5,494,580	1,908,143	52,550

The figures and proposed planned use for purchases in Minnesota, Iowa, and Missouri are—

PURCHASES					
State	Number projects	Acres included	Crop-land	Forest land	Pasture and hay land
Minnesota.....	2	101,119	16,000	65,000	20,119
Iowa.....	1	1,902	302	400	1,200
Missouri.....	3	14,196	3,196	5,000	6,000

PLANNED USE				
State	Crop-land	Grazing	Forestry, recreations, wild-life	Total
Minnesota.....			101,119	101,119
Iowa.....	840	700	360	1,900
Missouri.....		5,760	8,436	14,196

Additional purchases of both new lands and lands to complete adjustments in existing project areas need be made. In the Great Plains, several millions of acres are now either county owned or subject to tax deed. The programs of the Soil Conservation Service contemplate, appropriations permitting, the acquisition of several hundred thousand of these acres.

Additional activities of the Soil Conservation Service include operation of demonstration farms, supervision of farm forestry and Civilian Conservation Corps work, and the special assignments of programs of water

facilities and of flood control by small engineering works on the upper reaches of watersheds. For lack of space, we confine our description to the water facilities and flood-control activities. Under a special water-facilities act, the Soil Conservation Service constructs water facilities for livestock and farmstead use. The consequent irrigated areas vary in size from a family garden to a group facility serving 15 farms. Such a program is designed to furnish needy families with supplemental aid so long as the total cost per facility is less than \$50,000. In the Plains States of the Dakotas and Nebraska, 14 projects have been approved for planning, 11 for operation, and 25 demonstration counties have been selected.

More important than the water-facilities work, at least in its potentialities, are the flood-control activities of the Soil Conservation Service in those watersheds authorized by Congress. As the Lincoln office of the Soil Conservation Service reports—

The ultimate objective of the flood-control activities in field operations in which a remedial agricultural program for the control of floods is put into practice on farms located in flood-source areas of watersheds having substantial flood damages and erosion loss. The program is designed to complement downstream remedial measures put into practice by the War Department.

To date, 36,190 square miles have been examined by the Lincoln office, and surveys recommended in 9 watersheds. The Milwaukee office reports for Minnesota, Iowa, and Missouri: 1 detailed survey completed, 4 detailed surveys in progress, 12 preliminary reports completed, and 3 preliminary surveys in progress. While this activity (as well as the water-facilities program) is a water program, it intimately and primarily affects land use and, in addition, may be of material assistance in reducing "erosion, run-off, and flood damage."

Urban Land Use.—In addition to rural land-use planning, there is the problem of urban land use. One of the greatest economic wastes in the United States is needless depreciation of urban land values, largely the result of uncontrolled use. These losses occur most often in the "rurban" fringe and at the interior border zone where business and commercial districts join the older residential area. Fortunately, the more progressive municipalities are attempting to meet this problem through zoning ordinances and zoning and city planning commissions. A vigorous educational program, however, is needed in every community to bring to the people the full realization of the appalling losses resulting directly from haphazard development and the need and opportunity for avoiding such losses in the future. A new concept of the urban land-use pattern is rapidly emerging.

Objective

To attain a stable population and a balanced economy in the Missouri Valley, and as a complement to the

water plan, there must be developed an adequate land-use plan. By that combination of plans can the twin goals of a maximum of economic security and a minimum of relief expenditures be approximated. Such a plan must eventually show for every rural acre of the region its proper use, be it for cropping, grazing, mining, forestry, or recreation. Likewise of nearly equal importance, economically and socially, is the formation in every urban community of an adequate pattern for the most advantageous use of every parcel of land within or near the corporate limits.

Recommendations

The objectives of a sustained land-use program can generally be attained through one or more of the following recommended devices or methods:

1. Creation of soil-conservation districts. (All the States in the Missouri River region except Missouri have district laws.)

2. Creation of county and community planning committees. (Used effectively in Minnesota and Missouri in cooperation with county land-use committees.)

3. Enactment of county zoning laws along the lines of the Wisconsin law. (This law is especially helpful where land is classified for agricultural, forestry, or recreational use. Thus, in rural problem areas, land use can be stabilized and savings made in expenditures for public services.)

4. Acquisition by counties (or States) of tax-deed lands:

(a) Such acquisitions should be classified into agricultural and nonagricultural;

(b) Nonagricultural lands should be withheld from sale and devoted to such use as may be justified by good conservation practice;

(c) Agricultural land should be offered for sale or lease under restriction as to size of farm unit and type of use.

5. A program of education in proper land use should be extended by agencies of the Department of Agriculture (example, Soil Conservation Service) and the extension services of the land-grant colleges.

Specific Recommendations.—1. Continued organization of new conservation districts. (See item 1, above.)

2. Continuation of the Civilian Conservation Corps camps to assist in the work of soil-conservation districts and in reforestation and recreational developments.

3. Retirement of all selenium lands from agricultural use until experiments of agricultural agencies discover safe ways of utilizing them.

4. Continuation of water facilities program within the broad limits as now defined.

5. Expansion of flood-control work of Soil Conservation Service as an integrated part of the drainage-basin work of Federal agencies.

6. Shift in use of the rougher lands of southern Iowa and northeast Missouri from intertilled crops to hay and pasture. This will require a combination of education and State and Federal assistance.

7. Completion of soil maps for every county.

8. Reorganization of local governmental units, especially (a) school districts and (b) counties and townships, in order to reduce the cost of local services without affecting their quality, (applicable primarily in problem areas in northern Great Plains, cut-over area, and Ozarks).

9. Organization of official county planning boards to cooperate with the county agricultural land-use planning committees.

10. Relocation and rehabilitation by the Federal Government of populations deprived of their homes and livelihood by land-use adjustments. This can be done in several ways: one is to move people to new agricultural sites; another is to create for them new occupations in local industries and handicrafts.

11. State and Federal aid to assist tenant farmers to acquire farms, providing the purchase program appears to be feasible and consistent with a proper land-use plan.

12. Protection of agriculture by the Federal Government from possible disarranging effects of war and preparations for war. This will require the determination of the use capability of land. With such an inventory, we will know where "expansion of the Nation's agriculture (for special war demands) can be made with the least hazard."

This information set to an action program can assist in avoiding a repetition of the irreparable damages done to soil resources during the first World War.

13. Strengthening by adequate State appropriations of the coordinating functions of State planning and resources boards.

14. To meet the urban land-use problem, we recommend—

(a) Control of land use by all municipalities within and beyond city limits;

(b) Extension of land ownership by municipal corporations to areas beyond city limits;

(c) Adjustment of corporate limits to include those fringe communities that are actually a part of the city as an economic and social unit;

(d) Creation of active planning and zoning commissions in every urban community. One function of these bodies should be the planning of their communities in accordance with present world happenings and conditions.

Specific Recommendations for the Great Plains.—

Implementation of the recommendations⁶ of the Northern Great Plains Committee, which include proposals for:

1. Readjustment of the land-use pattern through—
 - (a) Irrigation, where economical.
 - (b) Adjustment of dry-land farming practices.
2. Changes in farm pattern—
 - (a) Increased size of operating unit.
 - (b) Return of land to grass.
 - (c) Increased livestock farming to replace cash grain.
 - (d) Development of drought- and pest-resistant crops.
 - (e) Integration of town and farm economy.
3. Coordination of all interested State and Federal agencies.

Minerals and Energy Resources

The Problem

Mineral production is an important source of income in at least five of the States of region VI. Important commercial minerals include iron ore, oil and gas, lead, zinc, and coal. Other minerals, some of minor value and some of potential value only, are lignite, manganese, tiff, and tin.

Two problems exist in mining areas. The first is that of conserving the supply. The most notorious wastages have occurred in the natural-gas field. That product has been blown into the air, or stripped of its natural gasoline, or burned for illumination of the fields, or burned to make carbon black. None of these is an economical use. Thus, there is an imperative need for enforced conservation of all precious natural resources, particularly gas and oil.

The second problem arises when a new labor-saving device in mining antiquates old processes, or when other developments reduce significantly and permanently mineral production in established fields. The first of these is found on the iron ranges, the second in the coal fields of this region. In either case, the result is the same, namely, stranded populations. The problem becomes doubly serious because about the only alternate activity for these stranded people is on adjacent inadequate and often unfertile farm lands. In other words, the farm lands surrounding most of the mining areas are not capable of furnishing an adequate living. Therefore, the second problem becomes one that can be met in only one of two ways: Creation of new industrial activities or migration of unemployed people.

Objective

The objectives in a program of use of mineral and energy resources must include (a) elimination of waste

in mining and processing, (b) research in new methods and processes for further use of minerals and their by-products, and (c) long-range plans for rehabilitation of unemployed mine workers and supplemental part-time farming or other employment. Thus, not only will employment be increased or stabilized, but the time of exhaustion of these resources will be greatly postponed.

Recommendations

1. Reservation of certain minerals for exclusive war use.
2. Development of pilot plants to explore war uses of manganese, tin, and tungsten.
3. National and State legislation to prohibit waste in mining of all minerals, especially oil and natural gas.
4. A Federal program of relocation and rehabilitation of stranded populations of the southern Iowa coal areas, Minnesota iron ranges, and tiff mining area of Missouri.

Industry

The Problem

Fundamentally, the States of region VI are food, fiber, and mineral producers. Yet, they have some important manufacturing industries. With the exception of iron ore, every raw material receives some processing before it finds its way as a finished product into outside markets. These are the kinds of industries that logically develop in a raw material producing area. In addition to those already in operation, region VI has reason to anticipate the growth of other manufacturing, such as processing of raw materials, wastes, and byproducts now undeveloped; defense industries and national or footloose concerns seeking new locations. The advantages of the midcontinent area for defense and peacetime industrial location are many. It has a large market and is near large markets. It has labor supplies, free capital, raw materials, and adequate transportation facilities.⁷ For defense industries, region VI is a most strategic choice because of its interior location. In short, by industrial development along economic lines, a great stride forward will be taken in the restoration of a balanced economy.

Objective

The industrial objective of the Missouri Valley region comprehends the economical development of its resources and stimulation of private initiative and investment in industrial enterprises in order to create a balanced economy in the valley. Agriculture is this region's basic industry, and it is reasonable to assume that the region's major industrial activity, apart from

⁶ These are found in *The Future of the Great Plains*, a report of the Great Plains Committee, 1936; and *Northern Great Plains*, a report of the Northern Great Plains Committee, 1940.

⁷ This is not to say, however, that the relative level of freight rates into and out of region VI is equitable. See item V, below.

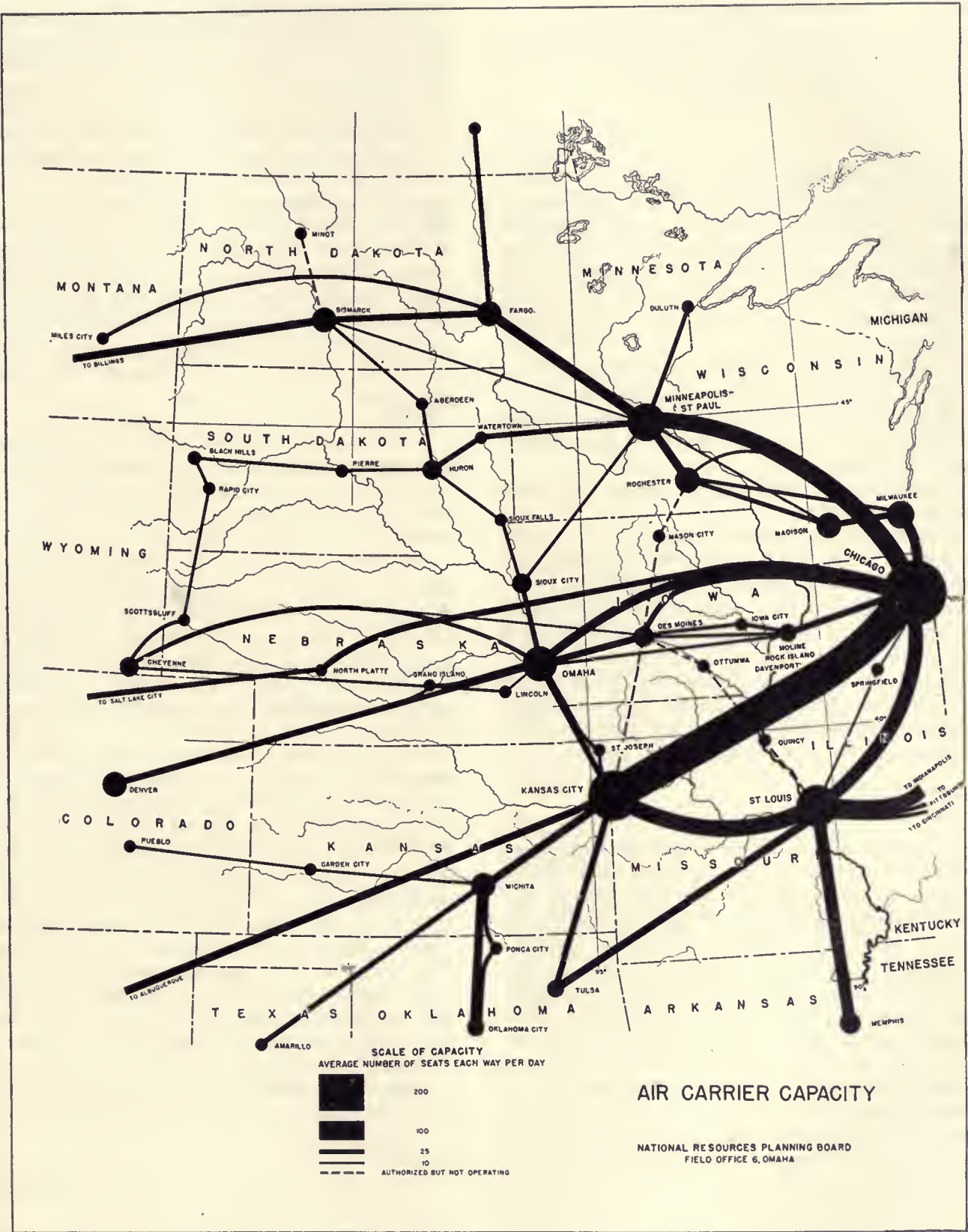


FIGURE 3.—Air Carrier Capacity

This figure shows the average carrying capacity of transport planes operating in and through Region 6. The width of band on the map shows the average daily one-way seating space available. Altogether, nine licensed companies furnish this service.

certain defense industries, must generally be based on the processing of farm and mineral products and by-products. Continued research to uncover most economical methods of processing and new uses for farm products is desirable.

Recommendations

1. Industrial surveys in every State of the region.
2. A State agency, similar to the Minnesota Research Institute, to investigate industrial opportunities, to encourage prospective industries by careful investigations of technological processes, costs, markets, etc. (The Minnesota Research Institute is located at the University of Minnesota, and operates closely with the Minnesota Resources Commission.)
3. A State supported agency to conduct research in new uses of industrial minerals, new processes, etc.
4. Analysis by State and regional offices of the industrial advantages of this region for the location of defense industries.
5. Encouragement of industrial location in those areas of unbalanced economy.
6. Establishment of technical schools to train technicians needed by existing and probable new manufacturing establishments. (This program could be materially assisted by the Office of Education, and aided by both the National Youth Administration and interested industries.)
7. Establishment of a system of apprenticeship in industries using skilled employees. Such a system should be developed through the joint efforts of labor, management, and the public schools.

Transportation

The Problem

In the history of the United States, the agencies of transportation have played an important part. Wherever there were good seaports, or intersecting rail and water, or railway junctions, there were established our cities and towns, and around them developed the countryside. Thus, the sea and canal made New York City and opened the Lakes country to development. Later, the railroads made Chicago and other midwestern cities and opened the prairies and plains to settlement. In truth, because of the dominant position of the railroad, the internal history of the United States from 1850 to 1920 can be labeled the "railway age."

Since 1920, the picture has changed; the internal monopoly of the rails has been broken. The waterways have again become common carriers, and two new carriers have arisen—the motorbus and the airplane. One consequence has been to free cities and regions from domination of the railroad. A competitive carrier system cannot make or break towns and industries. On the other hand, the years since 1920 have produced

their problems in the form of cutthroat competition, wasteful duplication of services, confusion as to the ultimate role of each type of carrier, and debilitation of the railroad. Truly, the transportation future of the region (and of the United States) needs to be planned.

At present, many agencies are planning for our future transportation needs, as in the highway planning surveys of the State highway commissions. The Public Roads Administration is assisting in this work. Plans also have been prepared to deepen the channel of the Missouri River from Sioux City to St. Louis from 6 to 9 feet. The future of the airways is the mutual concern of State officers and the Civil Aeronautics Authority. These agencies have plans and programs for airport expansion and development. These are equally concerned with the proper training of civilian pilots.

Objective

The shipments out of the region of bulky agricultural and heavy mineral products, existing and potential, require careful planning in order to provide the most effective and economical transportation facilities. At present, the unfavorable transportation rates that penalize this region are the major transportation problem the region faces. The question of joint rates among rail, highway, and inland-waterways transportation is also vital. Insofar as capacity to handle the agricultural products of this region is concerned, present facilities are generally quite adequate. A well-planned highway program of low-cost hard-surfaced road construction will make the local markets available on a year-round basis at a minimum cost to the users. Low-cost surfaced roads are essential to the farming and range areas of this region. Lower-cost transportation in all forms would be a factor in the development of potential mineral resources, in the encouragement of industrial expansion, and in lower marketing costs to the farmers. Furthermore, broad, channelized, divided, supertranscontinental highways and parkways, with frequent turnouts, lookouts, and rest and recreation areas, will provide for easy, fast, and safe transport for troop supplies and all sorts of equipment for defense both in war and during times of peace for maneuvers and training purposes. Especially is the region well situated for development of airports and airplanes; that is, favorable weather and terrain and great distance encourage private as well as commercial flying.

Recommendations

1. Increased use of new articulated passenger equipment for rail transportation.
2. Readjustment by the United States (Interstate Commerce Commission) of rail freight rates to eliminate unjust discrimination against goods produced in the midcontinent area and marketed outside the region.

3. Construction of 4-lane divided highways, (a) as approaches to cities of 50,000 and over, and (b) for cross-country traffic.

4. Construction of bypass roads around all towns of 50,000 and over.

5. Complete an economical program of farm-to-market roads and elimination of unnecessary country roads.

6. Continued use of master plans for airport development, including restrictions and long-term option on surrounding territory.

7. Public assistance in construction of airports, provided their probable future use will make them self-sustaining.

8. Integration of airport plans with city and county plans.

9. Development of airplane industry so long as that development is consistent with existing industries and labor supply.

10. Continued studies of the region to determine its facilities for airplane and airport development.

Education

The Problem

As settlement moved westward, the eastern pattern of public schools was successively duplicated, and under the stimulus of the Morrill Act, after the Civil War, the States of region VI established many institutions of higher learning—universities, land-grant agricultural colleges, and specialized schools of teacher-training and mining.

Since the return of drought conditions in the 1930's, the Great Plains States have been obliged to reexamine from top to bottom their entire educational structures. The question became: Could drought-stricken areas continue the traditional educational pattern? Was the program for higher education too ambitious, based as it was on an everincreasing and prosperous population? In all of the Plains States, these questions have been studied, and answers attempted. In the Dakotas, proposals have been advanced to reorganize and consolidate the public schools. In Nebraska, the State planning board has made several recommendations for reorganization of its institutional program. These include proposals to restrict the educational programs of the several teachers colleges, to eliminate duplication in the teacher-training program, to convert one of the teachers colleges into a State technical school, to strengthen the high-school curriculum, and to enlarge the rural-school district.

Objective

An essential to the preservation of democracy and intelligent planning is an adequate system of public education. The objective in an educational program

is to develop adequate facilities available to all regardless of economic status. To accomplish this objective, unnecessary duplication of facilities and curricula should be minimized or eliminated in the existing set-up and avoided in future development. Frequent self-appraisals are necessary to insure that the current offerings of the secondary schools and schools of higher education are designed to prepare young people for the opportunities that will be available. Each State should develop an integrated educational program in which each unit from the one-room schoolhouse to the individual institution of higher education has a vital part to perform.

Recommendations

1. State-organized system of education, especially vocational training, for all citizens, young or old. Such a program is essential to the rehabilitation of persons caught in problem areas.

2. A State-wide survey by each State of all levels of the education program to eliminate unnecessary duplications in facilities and curricula and to secure greater efficiency per dollar spent. (See the Nebraska Institutional Survey.)

3. Reorganization of the school structure in the special problem areas.

4. Development of extension instruction for continued adult education.

5. State and Federal aid to schools in problem areas too poor to finance an adequate program. (The principles contained in the New York Plan of Equalization should be considered for the Northern Great Plains States.)

Recreation

The Problem

Recreation, formerly the prerogative of kings and nobles, is now an essential part of every man's life. In earlier days, recreational areas existed naturally and usually close at hand. One could fish, hunt, boat, or roam in some nearby wooded stream or lake area. Today, recreational areas are few and too often inaccessible to large population centers. In the more level sections (and generally in these areas are to be found the population centers), almost all of the land is in farms. The percentages of agricultural lands in the Great Plains range from 95 to 75 percent of the total area; the extremes in the region range from 97 to 63 percent. Thus, in large portions of this region, practically every acre is privately owned and devoted to some form of agriculture. In the meantime, an ever larger portion of the people in region VI are to be found in urban centers. The net result has been to deprive many of them of every form of natural outdoor recrea-

tion, unless facilities are provided by local, State, and Federal agencies.

For some years, State park commissions and the National Park Service have been cooperatively planning and developing recreational facilities, largely with Civilian Conservation Corps labor. As the 1940 Yearbook of the National Park Service says, "This program is one of real conservation of both human and natural resources."

Objective

Land planning for recreation, in addition to the preservation of outstanding scenic, historic, and wildlife primitive areas, should consider the recreation aspects of water courses and water projects. Reservoirs for navigation, flood control, power, and irrigation have varying potentialities for recreation; these possibilities should be evaluated during project planning. To realize the maximum of recreational values in the region, there must be close cooperation among the several park and planning agencies, namely, the National Park Service, the State park and conservation commissions and the city and county park boards. Among the more recent recreational facilities are the scenic overlooks, wayside rest areas, and parkways established on important highways by the State highway commissions and the Public Roads Administration. This new recreational resource should be expanded and carefully planned in order to serve further the recreational needs of the region. Working in close harmony, all these agencies can accomplish the objective of happier and healthier citizens living in a finer land.

Recommendations

1. Acquisition by counties, States, or Federal Government of all outstanding scenic areas, scientific, wildlife, and historic sites.
2. Establishment by counties and States of vacation areas within 200 miles of population centers as camps for children and family groups.
3. Construction by States and Federal Government of parkways and trailways.
4. Provision of public beaches and water-front developments.
5. Establishment of day-use facilities, including a playground within one-quarter of a mile, playfield and recreation center within half a mile to 1 mile, and a sizable park within 2 miles of each resident of a metropolitan or urban region. Informed opinion recommends a minimum recreational acreage of not less than 10 acres for each 1,000 persons living within a municipality.
6. Protection of highways used extensively for pleasure travel by one or more of the following methods: Acquisition of wide rights-of-way; control or use of

adjoining lands by zoning, elimination of roadside advertising; grading for safety and for erosion control and planting in harmony with adjoining countryside; provision of wayside rest areas, safety turn-outs, and parking overlooks.

Housing

The Problem

The type and kind of places in which people live have been left entirely to the chance combination of taste and economic circumstances. In fact, because housing relates to land, its development has been particularly guarded against public interference and guidance. Until the First World War, housing in the United States was seldom the concern of public officials. As a consequence, there have arisen many problems and serious deficiencies in urban and rural housing. Many dwellings are inadequate, more are unsightly, and seldom are they planned with a view to a harmonious group. Unless restrained by zoning ordinances, one builds a single unit, a duplex, or an apartment—without regard to surroundings or the economic needs of the occupants.

Nation-wide attention was given to the problem of housing when President Hoover told his White House Conference on Housing that 25 percent of the people of this country were improperly or inadequately housed. In recent years, several Federal and State agencies have tackled this problem from one angle or another. First the Resettlement Administration, later the Farm Security Administration, has concerned itself with rural housing. At present, the urban problem is the province of the Federal Housing Administration and the United States Housing Authority. The former is concerned with the certification of funds loaned for individual home construction, the latter with low-cost housing projects for the low-income groups, heretofore condemned to slum quarters.

According to present statistics, there is widespread evidence of underhousing in nearly all the cities of this region. Assuming, as the United States Housing Authority does, that 17.5 percent of all families are in need of housing, for the States of this region 227,000 new structures should be built immediately. In the detailed work of housing planning, the work of the State planning boards should not be overlooked. For instance, the Iowa State Planning Board has made detailed housing surveys of several Iowa cities, setting out the areas for demolition and housing construction. In addition, it has produced an illustrative booklet, *The Forgotten House*, that has attracted Nation-wide attention. Further, much basic information already assembled on vacancies, disease, vice, crime, fires, and tax delinquency should be most valuable in many instances where there is immediate need of housing for defense industrial workers.

Objectives

The objective of a housing program is to make available adequate housing facilities to all underhoused families, rural and urban. The accomplishment of this objective will require a combination of plans of both public and private agencies to restore the economic balance of the region and to assist in developing a complete housing construction program. Furthermore, the housing of the future may look altogether different. As the United States Housing Authority has already shown, the single housing unit is less economical than group housing. In fact, the housing needs of the future may only be realized by the creation of a new pattern of community life for both rural and urban areas.

Recommendations

1. Continuation and extension of the activity of the Federal Housing Administration, the United States Housing Authority, and the Farm Security Administration.

2. Studies by these and other research and planning agencies of ways and means of lowering housing costs.⁸

3. Studies by these and other research and planning agencies of new types of housing and housing materials designed to further new community patterns.

4. Further studies in the substitution of group housing for the present isolated farm family so typical of American rural communities.

5. Establishment of adequate city and county zoning laws to protect residential property values.

6. Correction, where needed, of zone areas to conform to present economic and industrial needs.

7. Enactment of laws by the States of Iowa, Kansas, and South Dakota whereby the United States Housing Authority may operate in these States.

8. Construction by Federal agencies of adequate housing for civilian employees moving to new defense industrial locations. This construction should be in conformity with local planning and zoning requirements and in accordance with the best principle of architectural city planning and engineering design.

Public Works and

Public Works Programing

Public Works

The Problem and Objectives.—There should exist at all times a reservoir of needed public facilities, the construction of which will not only preserve and develop our resources and raise civic standards, but which can be used to meet the distress of unemployment whenever significant numbers of persons find themselves thrown out of work. If planning in region VI and the Nation

accomplishes its objective of a stabilized economy, the only significant relief load will be that created by cyclical movements in business activity. Pending the realization of that objective, it will, of course, be necessary to plan public works operations to meet the larger problem of relief of needy persons, be that need created by drought, industrial decadence or change, or depressions. Of necessity, then, intelligent administration of such a program requires careful planning. In this respect, there have been developed plans and planning machinery on the part of public-construction agencies.

Recommendation.—1. Continued Federal assistance in public construction. Note that the following 545 applications were received in 1938 by PWA, but not approved because of lack of funds:

118 schools.....	\$10,067,000
37 college and university buildings.....	10,545,000
18 State institutions.....	3,496,000
17 hospitals.....	2,331,000
60 municipal buildings.....	8,876,000
20 courthouses.....	5,466,000
56 waterworks.....	3,805,000
32 sewers and sewage plants.....	3,736,000
92 highways, streets, bridges.....	40,604,000
78 power plants.....	6,640,000
3 airports.....	254,000
3 drainage.....	238,000
11 irrigation.....	5,913,000
Total.....	101,971,000

2. Financing by revenue bonds of projects such as waterworks, sewage-treatment plants, street improvements, school dormitories, power, irrigation, and drainage districts. For those States not now possessing revenue bond laws, we recommend the enactment of such legislation.

3. Legislatures in the drought-affected northern Great Plains area should be encouraged to enact laws similar to the act creating the Montana State Water Conservation Board, which act, among other things, provides for the issuance of revenue bonds payable from revenue from sale of water. The construction of irrigation projects, supplying supplemental water, will probably be found the most helpful in the final rehabilitation and stabilization of entire communities in such areas.

Public Works Programing

The Problem.—The traditional policy of local, State, and National Governments has been to embark on public construction with but passing study of actual public need, scant consideration of the recurring expenditures that will thereby be incurred, and practically no thought as to the timing of such work. Thus, at times of high interest rates and construction costs, we have built public structures not especially needed. About all that was certain was that the taxpayer had

⁸ As a sample of the work done on housing, we attach the following bibliography of studies by the Iowa State Planning Board: *The Forgotten House*; *A Report of Progress*, pp. 310-354, September 1934; *The Second Report*, pp. 111-125, April, 1935.

taken on a lifetime obligation of capital repayments and annual maintenance charges.

Such planless public construction cannot be countenanced longer. Every level of government from top to bottom must now study and outline its needs (planning), analyze its financial resources (budgeting), and consider the proper timing of public works (programming). Significant strides are now being made in public-works programming. The Federal Government is committed to this policy. Several States, including Nebraska and North Dakota in region VI, are now beginning a demonstration of public-works programming on the State level. Certain cities (i. e., Fargo, N. Dak.) have already made careful studies. In short, planning seems to be coming to the area of public construction expenditures.

Objective.—Concisely stated, the objective of public-works programming is to require every public agency spending construction funds to program its operations in accordance with an accepted plan of development. This will mean that public needs and financial resources will have been interrelated into a rational public-works program.

Recommendations.—1. Mandatory State laws requiring the establishment of State machinery for public-works programming.

2. Continued assistance to State and local public-works demonstrations.

3. Continued Federal consultant service to States and local governments desiring to undertake demonstrations.

4. Development by the Washington office of the National Resources Planning Board of well considered and tested procedures for programming on the State and local level.

5. Studies by the Washington office of techniques by which proper timing of public-works programs can be determined.

PART III. LOOKING FORWARD

Regional Planning

Regional planning, properly conceived, is an intermediate step in over-all planning and, to be effective, is never completed. It is intermediate in that it has interrelations with State and local plans, on the one hand, and national planning, on the other. In its relation to State and local planning, a regional plan should integrate and correlate those of the smaller political units, should harmonize conflicts among them, lend strength to their ultimate operation. In its relation to national plans, a regional plan is similar to a State plan; it must be fitted and adjusted to conform to a harmonized national pattern. Many of the regional planning proposals must be nationally implemented.

Even more important, the planning function is never complete. Many persons think of National and State planning as a process of preparation of blueprints which, when finished, must be followed to the most minute detail. Aside from the fallacy of assuming perfection in architectural blueprints, such is far from the truth. The planning function is never finished. Our plans of today must be adjusted tomorrow in order to meet new conditions not known today. Thus, planning is a continuing and continuous task. Yet it is in no sense a meaningless sequence of change and hodgepodge adjustment. Planning objectives will change but slowly, if at all. The change will occur in the techniques for realization of planning objectives.

Regional Planning Commission

If regional planning is to be continuous and effective, it needs to be implemented by a regional planning commission. Therefore, as a final recommendation, we urge upon the National Resources Planning Board, the State planning boards, and related State and Federal agencies in region VI the immediate creation of a Missouri Valley planning commission. It could be organized similarly to the drainage basin committees with representatives from participating State and Federal agencies, or be composed of eminent lay persons, with a limited number of ex officio members. Such an agency could assume and execute the formation of plan coordination to the end that this region would attain the optimum economic and social stability.

Future Possibilities

By coordination of all planning agencies—local, State, Federal—we shall solve the problems now confronting the people of region VI. On the Great Plains will be wrought a new land-use pattern, one in which land and water are brought into proper balance, and by which the best of farming methods will be practiced. In this adjustment, new social and political institutions suitable to semiarid agriculture will arise to replace present defective ones. Thus will the combined intelligence of our people bring a stabilized economic pattern to the Plains.

Similar changes will be brought about in other problem areas. We are learning, and we shall continue to learn, how best to utilize our timber and mineral resources on a conservative basis. Instead of stranded populations now subsisting on public aid, new pursuits will be developed for them. For example, at least a part of the unemployed in the Minnesota cut-over and iron range areas will be working in the new alpha-cellulose plants along Lake Superior. Some of the people of the Dakotas will be busy converting Dakota

lignite into char, a material that has several important uses. No less important economic transformations will have been made in other areas.

In the more humid parts of the region, especially in Minnesota, Iowa, and Missouri, significant changes will have occurred. The senseless soil exploitation of the past, evidenced by the amount of erosion that has occurred on the steeper slopes, will have given way to a conservative agriculture. Less intertilled crops and more pasture will characterize the landscape. Less tenancy and more home ownership will likewise be the rule. A new principle of farming will be evolved, namely, to hand down a land of improved productivity to each oncoming generation.

The cities and towns of the future will also be changed. In addition to their present function of servicing the surrounding countryside, they will come to possess a second function. As industry migrates west, many urban places will see the rise of factories, thereby acquiring the prime facility for greater regional economic balance. With its great advantages of interior location, adequate transport facilities, and abund-

ant raw materials, the possibilities for extensive development both of peacetime and of defense industries are excellent.

While the cities and towns are acquiring this new function, they will likewise be undergoing an outward transformation. Group housing available to all who cannot afford single-unit facilities will rise on the site of the present slums. Cities will have their parks and boulevards; the "rurban" fringe will have been cleaned up and beautified.

Finally, for all there will be adequate educational and recreational facilities. Educational opportunities for young and old will exist. The educational pattern will have been accommodated to the needs of our people. Recreation will have assumed its rightful place in the social organization. Within economical distance of every urban center will be found attractive parks and playgrounds. Wherever nature has built an unusual beauty spot, it will be set aside for all time for the use of everyone.

Thus will planning assist in the realization of a land of stability, security, health, and happiness.

**PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
MOUNTAIN STATES: REGION 7, DENVER, COLO., 1940**

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Report of the Mountain States Regional Planning Office

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FOREWORD

The National Resources Planning Board has requested that each of the nine regional offices of the Board submit reports for their respective regions, delineating the essential framework of a plan for the development and conservation of the resources of the region.

Pursuant to that request, this report presents the results of the efforts of the region 7 office, in cooperation with Federal, State, and local interests, to prepare such a plan for the Mountain States region.

Conservation of resources does not mean abstinence from use or hoarding; rather, it means the wise and efficient use of our resources in the interest of the regional and national welfare, the avoidance of unnecessary waste in their development and utilization, and the safeguarding in economic health of the industries and population on which we rely for the development of those resources. It is the purpose herein to set forth for the Mountain States region a plan for the development and conservation of its resources, keeping in mind this definition of conservation.

This plan, or rather, framework of a plan, does not presume to be a complete plan for the region. A complete plan is a concept not yet attainable in the Mountain States region. It does, however, endeavor to present the major objectives of regional development and to outline the patterns of action for the attainment of those objectives.

In the preparation of the material for this report, the regional office has had the advice and assistance of many agencies and individuals throughout the region. At a regional meeting held in Denver on September 17, 1940, attended by representatives of State agencies of Colorado, New Mexico, and Wyoming, and by representatives of the many Federal agencies concerned in the region, a preliminary draft of the regional plan was presented and discussed. Many valuable additions, revisions, and criticisms resulted from this meeting, and subsequently, many of those in attendance contributed material for and participated in the preparation of certain sections of the report.

Because of its regional nature, the plan presented cannot be of the specific or blueprint form that might be possible for a small area or individual project. It must be over-all, and emphasize the larger aims above those of a more minor and transitory character. Moreover, it must be flexible—an adjustable framework susceptible of modification from time to time as required to meet changing conditions and needs. Above all, it should be subject to wide review and criticism to the end that its progressive development may represent a harmonious blending of the considered judgments of all regional, State, and local interests concerned.

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN MOUNTAIN STATES

Summary of Objectives in the Regional Plan

The framework of a regional plan, designed to meet the particular requirements for an integrated and balanced development of the resources of the Mountain States region, is set forth in this report by (1) discussion resources and problems; (2) statements of objectives; and (3) recommendations of patterns of action. The general objectives that are treated as to detail and specific application in this report are as follows:

I. Conservation and Development of Natural Resources

Stabilize and develop water resources under comprehensive basin plans.

Conserve land resources and improve land usage.

Accomplish greater development and use of mineral resources.

Improve and expand recreational development.

II. Expansion of Commerce, Industry, and Employment

Investigate present and potential power markets.

Conduct surveys to determine present and potential manufacturing plants, outlets for finished goods, and analyses of the failure of manufacturing plants.

Promote Federal and State participation in institutes of research in the fields of business, engineering, and labor.

Encourage local manufacturing and industrial development that will provide off-season employment.

Complete timber surveys and initiate economic studies looking to greater use of native timber.

Encourage the establishment of marketing cooperatives.

Supply more manufactured articles for local consumption.

III. Improvement of Facilities and Services

Study and analyze transportation problems; develop and improve transportation systems and facilities.

Improve character of small town and suburban development.

Improve conditions of sanitation and health; abate stream pollution; and insure safe water supplies for towns and cities.

Improve living conditions by providing better housing for low-income groups.

IV. Development and Protection of Human Resources

Establish State-wide and county-wide library systems.

Introduce more effective systems of vocational guidance and training.

Promote adult educational programs and extension courses.

Provide a more adequate program of outdoor and indoor recreation.

Establish rural and urban forums or planning groups.

Widen the sphere of influence of boys' and girls' organization.

Continue and expand educational work in the Civilian Conservation Corps and the National Youth Administration.

Initiate studies looking to the further consolidation of rural schools.

The Region—Its Characteristics, Resources, and Problems

For the purposes of this report, the Mountain States region may be defined as including Colorado, New Mexico, Wyoming, and portions of adjacent States. Statistical data, where given, represent the summation of figures for the three States only.

The Mountain States region, lying on both sides of the Continental Divide, occupies a strip of land having a maximum width of about 480 miles and an extreme length of 960 miles. Within it are included nearly 324,000 square miles, or 11 percent, of the total area of the United States. It contains many lakes, rivers, and small streams; gently rolling plains, valleys, and plateaus; forests, perennial snowfields; and numerous mountain ranges accentuated by towering peaks, many of which rise to altitudes in excess of 14,000 feet.

Prominent physiographical features are the long backbone of mountains and spurs running from the northwest corner of Wyoming diagonally southeast across that State and south through the central part of Colorado and New Mexico; the confused mass of ragged mountains and high plateaus covering much of the western half of the region; the great number of head-water streams and tributaries; and the great expanse of plains extending eastward from the foot of the mountains. It is significant that the region contains possibly 90 percent of all area in the United States above an altitude of 10,000 feet, and that between the highest point in Colorado and the lowest points in New Mexico

and Wyoming there is a difference of approximately 11,000 feet.

In the high areas the snowfall is heavy, and even during the drier summer months there is considerable precipitation on the mountain slopes. It is this mountainous area that largely provides the water for the irrigation of the land not only within the region but far beyond its borders, since heading in these mountains are the Yellowstone, Platte, Arkansas, Rio Grande, Colorado, Bear, and Snake Rivers.

The Mountain States region is one of the great natural resources. It has one-fifth of the national forest acreage, and one-seventh of all land in the national parks and monuments. Average annual water production from run-off originating within its borders amounts to more than 31,000,000 acre-feet. Its crop production is valued at one-fortieth and its production of livestock and livestock products at one twenty-fifth of the national totals. In 1937 it produced nearly 90 percent of the Nation's supply of molybdenum, 10 percent of its silver, 9 percent of its gold, 5 percent of the copper, 4 percent of the coal, and 3 percent of the petroleum and natural gas. The largest reserves in the United States of bituminous and sub-bituminous coals, molybdenum, vanadium, and possibly zinc, are within its boundaries. Its mountains, lakes, streams, scenic, and historical attractions provide recreation for visitors from all parts of the Nation.

Of paramount importance to the Mountain States region are its water resources. It is the proper coordination, development, and use of these resources for irrigation, power, recreational, and domestic purposes that constitute the major problem of the region. Because of the aridity of the region's arable lands, irrigation is essential to successful crop production. At present, much of the irrigated land is in need of supplemental water supplies. The provision of such supplies on the eastern slope requires importations from the western slope, and these must be made with due regard to the present and potential development of the western part of the region.

Most of the important streams are interstate in character, and their extensive use for irrigation has given rise to many interstate controversies. There are also many intrastate difficulties. The adjustment of these differences by interstate compacts and agreements between water users, as well as through coordinated plans of comprehensive development, must be consummated if maximum beneficial use of the region's water supplies is to be realized.

At times, the streams of the region carry destructive floods, in most part the result of torrential storms that are particularly characteristic of the eastern sections. There are, therefore, problems of flood control and an urgent need for the construction of flood-control works

fully coordinated with water-conservation development.

It is an outstanding characteristic of the region that its agricultural development is based largely on a livestock economy. In the plains there are large areas of grasslands interspersed with the cultivated lands. In the mountains vast areas of public and private lands are used as summer range for livestock herds that are maintained in the irrigated valleys. The farm lands and the grazing lands are intimately related and exceedingly important one to the other. Except for specialty crops, the farms and ranches are largely devoted to the production of feed for livestock. The income from agriculture is in a major way expressed in the financial returns from livestock. Problems of land use and land-use adjustments to bring about greater conservation of land and water resources are concerned in large measure with this interrelation of crop and grazing lands.

The scenic attractions of this rugged mountainous region, the abundance of wildlife, and the extensive area devoted to national parks and monuments represent a recreational resource of outstanding importance to the region. One of the problems of the region is to preserve this resource in coordination with proper and necessary development of irrigation, power, mining, and grazing.

There are nearly 2,000,000 people living in the region. During the last decade, the increase in population was 9 percent, or 2 percent more than the national increase. Slightly more than 50 percent of the region's population is rural but this percentage reflects largely the ratio between rural and urban populations in Colorado, the State of greatest population and largest cities. In New Mexico 75 percent of the population is rural, and in Wyoming, 69 percent.

OUTLINE OF THE REGIONAL PLAN

I. Conservation and Development of Natural Resources

A. Stabilize and Develop Water Resources Under Comprehensive Basin Plans

Because of the distribution of its arable lands, fully three-fourths of the region's 5,000,000 acres of irrigated land lies on the eastern slope of the Continental Divide. However, the streams draining the eastern slope produce less than two-fifths of the region's surface-water supply. Conversely, the western slope has one-fourth of the irrigated land and three-fifths of the water supply.

The accompanying outline map of the region shows the various drainage basins within and bordering it and indicates some of the major features concerned with water development.

Before the limitations of the available water supplies of the eastern slope were known and as a result of a cycle of favorable rainfall, irrigated agriculture was expanded to a point where the average annual production of the streams could not supply the demand, and since 1920, little new development has taken place. The limited arable lands susceptible of easy development on the western slope caused a similar retardation, although water supplies there were abundant, or could have been made so by storage development.

Water supplies on the eastern slope may be stabilized by additional storage of unused flood flows, by development of ground-water sources, and by transmountain diversions from the Colorado River or other basins. Major storage structures in the Yellowstone and North Platte Basins are indicated, but in the South Platte, Arkansas, Pecos, and Rio Grande Basins, present or authorized developments will largely regulate all unused flood flows. Need is indicated for several small storage projects for irrigation and incidental power in the Tongue, Powder, and Cheyenne River Basins.

Potential ground-water supplies may not contribute materially to the region as a whole, but because of their indicated importance to certain areas, studies to determine their potentialities should be undertaken immediately. These should then be followed by the enactment of legislation in Colorado and Wyoming to control use and prevent overdevelopment.

Stabilization to any great extent in the Bear, Platte, Arkansas, and Rio Grande Basins requires major transmountain diversions. One such diversion, the Colorado-Big Thompson, is under construction. Others given serious consideration are the Green-Bear, the Blue-South Platte, the Gunnison-Arkansas, and the San Juan-Rio Chama.

On the western slope, with the exception of the Uncompahgre and Grand Valley reclamation projects, the present irrigated lands are mostly small tracts in the tributary valleys. These lands are now in need of supplemental water, and storage developments are required to furnish this as well as to provide for the complete development of extensive areas of irrigable lands. New lands will be limited by their suitability for irrigation, available water, and cost of facilities. Since the cheaper direct diversion facilities and storage sites have been utilized, future construction will involve extensive financing, probably through Government sources.

In addition to nearly \$143,000,000 invested in the region's irrigation enterprises up to 1930, \$13,000,000 had been expended for drainage works. Nearly 800,000 acres are included in drainage enterprises, of which 54 percent are in the upper Rio Grande and Pecos River Basins, 17 percent in the Yellowstone, 14 percent in the Arkansas, 9 percent in the Colorado, and

6 percent in the Platte. For the successful continuation of irrigation, drainage will become more and more essential in removing harmful salt accumulations and in providing maximum return to the streams of waste waters for reuse below.

The urgent need for settlement of interstate and intrastate water controversies, and requirements for the construction of flood-control works on streams throughout the region have previously been mentioned.

Existing power development in the three States amounts to slightly more than 510,000 kilowatts, 70 percent being steam, 26 percent hydroelectric, and 4 percent internal combustion. Undeveloped hydroelectric capacity has been estimated to be 926,000 kilowatts. In connection with transmountain diversion projects and proposed projects on the Colorado River system, large blocks of power will become available for use in this and adjacent regions. Power will also become available as a feature of multiple-purpose projects such as the Kendrick and San Luis Valley projects.

Integrated basin plans are gradually taking form through the cooperative efforts of Federal, State, and local agencies and their representatives on drainage basin committees. Through such efforts, it is contemplated that these plans will take into account and properly coordinate all phases of irrigation, flood control, power, domestic and municipal and industrial water supply, recreation, wildlife, and related developments.

Although comprehensive plans have not been completed, certain general objectives and programs of action for the conservation and development of the region's water resources can be set forth, as follows:

1. Stabilize and supplement water supplies for irrigation, relieving severe annual shortages and frequent basin-wide shortages, and achieving thereby substantial increases in gross production per irrigated acre, the care of idle farm labor, and opportunities for resettlement and rehabilitation of farm families. To accomplish this, initiate and complete the requisite surveys and investigations and, based thereon, construct reservoirs, transmountain diversions, canal systems, and the pertinent works needed.

2. Proceed with the development of the water resources of the Colorado River Basin to accomplish the most beneficial and efficient utilization of those resources; development to include use of water for irrigation, range livestock and wild game, hydroelectric power, manufacturing, municipal and domestic supply, and to be properly correlated with transportation, industry, mining, recreation, and urban development.

Through the appropriate Federal agencies and State representatives, complete within a 5-year period the

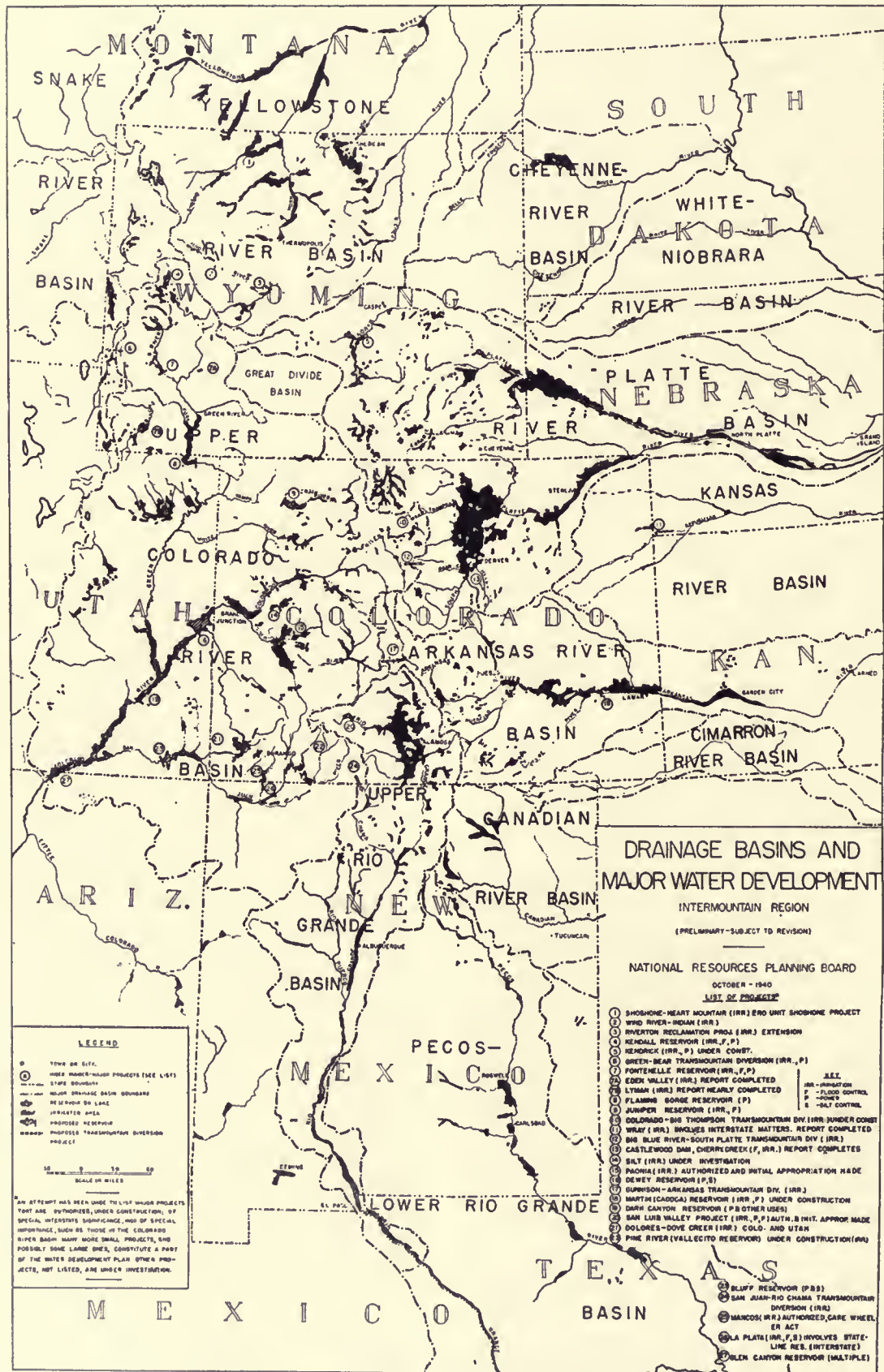


FIGURE 1.—Drainage Basins and Major Water Development.

comprehensive plan of development for the Colorado River Basin, as provided for in section 15 of the Boulder Canyon Project Act, using funds made available by the Boulder Canyon Project Adjustment Act, effective May 31, 1941.

3. Accomplish a more rational disposition and better utilization of available water supplies.

(a) Accomplish the storage and effective seasonal use of water now diverted unseasonably under direct-flow rights, by mutual agreements among water users. This pertains, among others, to the Greybull and Bear River Basins in Wyoming, and to the Upper Rio Grande, La Plata, and Arkansas River Basins in Colorado.

(b) Likewise, where storage is not possible, accomplish more effective seasonal use of water diverted under direct-flow rights, by mutual agreements among water users. This pertains, among others, to the Laramie River Basin in Colorado.

(c) Promote better economy in the application and use of irrigation waters. This includes the re-use of water, the salvage of water not beneficially used, and the maximum return to the streams of water not required for crop production.

(d) By means of interstate agreements or compacts, urgently seek the settlement of interstate water controversies on the Platte, Laramie, Arkansas, Pecos, and Little Snake Rivers. Similarly, seek adjustment of interstate problems on the Bear, Snake, Yellowstone and tributaries, Gila, San Juan, and other interstate streams of the region. To this end, expedite the initiation of investigations and the collection of the basic factual data needed.

(e) Conduct cooperative State-Federal surveys to determine the quantity and quality of ground water supplies in areas where proposals for or initial developments have been made. This applies particularly to areas in the vicinity of Pine Bluffs, Wyo.; to the South Platte, Republican, Arkansas, and upper Rio Grande Basins in Colorado; and to areas in Lea, Roosevelt, Luna, and Hidalgo Counties in New Mexico. Coincident with above cooperative surveys, secure the enactment of effective ground water legislation in Colorado and Wyoming to prevent threatened litigation and overdevelopment of ground water resources. Ground water development in New Mexico has been effectively controlled by State law for many years.

4. Proceed with necessary studies and construct small dams for water conservation and utilization on headwater streams, where such developments are

consistent with the preservation and maintenance of present and prospective requirements of downstream water users.

5. Complete the investigations and surveys for flood control and proceed with the construction of works for adequate flood control throughout the region as an integral part of the conservation and development of its water resources. Evaluation of benefits and costs of flood-control projects should be on a basin-wide basis. This constitutes a part of the multiple-use project development and watershed protection in the stream basins of the region and contemplates continuance and completion of investigations now under way and the initiation of other necessary investigations, in the Yellowstone, Platte, Republican, Arkansas, Cimarron, upper Rio Grande, Pecos, and Colorado River Basins.

6. Accomplish fullest economic development and use of power resources. As a prerequisite, make detailed investigations of present and potential power markets for hydroelectric and other power that can be developed throughout the region, such studies to include—

(a) An analysis of the economic foundation for power markets in each State and probable future trends of development.

(b) A complete compilation and analysis of existing power production and transmission facilities.

(c) An analysis of past trends and forecast of probable future trends of sales and energy requirements of electric utility systems.

(d) Estimates of the probable future deficiencies in power supply as a part of the market for the total possible output.

Upper Yellowstone River Basin.—Considered as within the Mountain States region is that portion of the upper Yellowstone Basin comprising the drainage area of the Yellowstone and Big Horn Rivers above their confluence, and the drainage areas of the Tongue and Powder Rivers in Wyoming.

Future growth in the upper Yellowstone River Basin will depend largely on the development of new irrigated lands. Water supplies, generally, are more abundant in relation to the demand than on most eastern slope streams of the region, and the Yellowstone, Big Horn, and Powder Rivers offer many opportunities for further irrigation development. On the main river, separate pumping units may prove more economical than long gravity canals. On the Big Horn and Powder Rivers, storage development is of importance.

Major projects on the Big Horn River and tributaries comprise the Shoshone Indian project and the initial developments of the Riverton and Shoshone reclamation projects. In addition to completion of development on

these projects, many other developments have been proposed, including a major reservoir in Big Horn Canyon to provide supplemental water for lands in Montana. Several small storage developments are planned on the Tongue and Powder Rivers for irrigation and incidental power. Possibilities for ground water development are indicated in the Owl Creek watershed west of Thermopolis, and provision should be made for surveys to determine the quantity and quality of this source.

The Bureau of Reclamation has been authorized to conduct investigations to determine irrigation and storage possibilities in the upper Yellowstone Basin, exclusive of Yellowstone Park, and these have been initiated in the Big Horn and Powder River Basins.

Most streams of the basin are subject to flash floods causing destructive channel overflows. Below Billings, Mont., bottom areas are subject to inundation and silt deposition. The predominant agricultural use of the watershed is for grazing, and in recent years drought and overgrazing have brought an increase in areas approaching badlands in character. Major erosion problems exist on the interstream uplands along the minor tributaries of the Yellowstone River below Columbus, Mont., and on extensive areas in the Big Horn and Powder River Basins.

Minor protective works and a well-directed program of range and cropland management are indicated as necessary to alleviate flood damage and control erosion and silting.

For unified and maximum beneficial utilization of the water resources of the Yellowstone Basin, it is essential that interstate controversies be settled before potential developments in the separate States reach an advanced stage. Congressional authorization has been given to the States of Montana, North Dakota, and Wyoming to negotiate a compact that will provide for the equitable division of Yellowstone waters between the three States. It is important, therefore, that the States take action to consummate such a compact at an early date.

Upper Platte River Basin.—That portion of the Platte River Basin in the Mountain States region comprises the drainage of the North and South Platte Rivers west of the one-hundredth meridian. In this area, the predominant demand upon the water supply is for irrigation, and because the demand is large compared to the supply, conflicts between Colorado, Wyoming, and Nebraska have developed, as have also controversies between intrastate interests.

Irrigation must be the foundation of any plan for the development of the Platte River Basin. Much more fertile land is available than can be watered, and there are sufficient reservoir sites to provide practically complete regulation. Water-power development will aid

in financing irrigation but must always remain secondary and incidental to it.

Consideration should be given to the initiation of an appropriate procedure for a joint study of present and potential development and interstate problems on the North Platte River, for the purpose of adjusting on a more constructive and beneficial basis, as by compact, the controversy now evidenced by litigation between the States of Colorado, Nebraska, and Wyoming.

On the South Platte River, the essential requirement is for supplemental irrigation supplies, which must largely come through transmountain diversions from the western slope. Early completion of the Colorado-Big Thompson project is needed to supply the northern Colorado district. Other transmountain diversions, such as the proposed Blue-South Platte to supply the area in the upper portion of the river valley, require prompt study and serious consideration.

To provide needed flood control in the Platte River Basin, surveys of the War Department and Department of Agriculture should be completed promptly and the flood control works and measures indicated as needed, carried out. Reports on the Cherry Creek flood-control project for protection of the city of Denver have been completed by the United States Corps of Engineers and the Bureau of Reclamation. Preliminary examination flood-control surveys on the South Platte River and tributaries and a special survey on Bear Creek have been authorized and made but reports have not been released.

Upper Arkansas River Basin.—As within the Mountain States region, the upper Arkansas River Basin is that portion of the drainage area above Garden City, Kans.

The major element of a water plan for the upper Arkansas River Basin is the development of a more reliable water supply for present agricultural lands, which have long suffered from lack of an adequate supply. This can be achieved, in small measure, by the additional storage of unused flood flows and by transmountain diversions from the western slope. The Martin (Caddoa) Reservoir near Lamar, Colo., now under construction by the United States Corps of Engineers, will largely regulate and make available the unused flood flows.

There are at present several small transmountain diversions that bring water into the basin, but studies looking to the feasibility of larger diversions, such as the proposed Gunnison-Arkansas, should be completed.

Some irrigation water is derived from underground sources. Cooperative investigations to determine the quality and quantity of the underground sources should be initiated and subsequent control exercised to protect this resource from overdevelopment.

Floods on the main Arkansas above Garden City and below to Larned, Kans., will be largely controlled by Martin Dam and Reservoir, but flood problems, especially on Fountain Creek near Colorado Springs and Pueblo, and on the Purgatoire River near Trinidad, have not been solved. Surveys have been authorized and made by the Departments of War and Agriculture on the Fountain River near Colorado Springs and on the Purgatoire River near Trinidad, but the reports have not been released.

With the assurance of the construction of Martin Reservoir, efforts are being made to consummate a settlement of the long-standing controversy between Colorado and Kansas over the allocation of Arkansas River waters. Early action to consummate a compact or agreement providing for the equitable apportionment of the waters between the two States is desirable.

Abatement of industrial pollution at Pueblo and other cities along the river is a problem demanding attention, and adequate sewage treatment should be extended to all cities and towns using the streams as wasteways.

Pecos River Basin.—The Pecos River Basin, comprising a drainage area of some 39,000 square miles, occupies much of the eastern part of New Mexico and a portion of southwestern Texas. From its source in the mountains northeast of Santa Fe to its confluence with the Rio Grande in Texas, the river has a length of nearly 800 miles.

As in the upper Rio Grande Basin, irrigation in the Pecos River Basin has developed to the extent that practically all water supplies available to the irrigated lands are consumed. Storage reservoirs on the main river provide practically complete regulation of the stream except in the lower 150-mile section, which is below all irrigated lands.

The major problem in this basin is that of providing adequately for the existing irrigation development in the river valleys of New Mexico and Texas and at the same time accomplishing an equitable division of the river's waters between the two States. Controversies between the States over Pecos River waters have existed for many years, and this, together with other pressing problems concerned with salinity, erosion, silting of reservoirs and channels, and floods, led to the initiation of the Pecos River joint investigation, which is now underway. The purpose of this investigation, a cooperative endeavor of State and Federal agencies under the leadership of the National Resources Planning Board, is to develop the needed factual information with respect to water supply, water uses, and requirements, salinity, siltation, and floods, to serve primarily as the basis for a compact between the States providing for an equitable division of Pecos River waters, and secondly as the foundation for remedial measures to control salinity, erosion, silting, and floods.

Essential objectives in a plan of development for the Pecos River Basin are therefore—

Complete the Pecos River joint investigation;

Consummate a compact between the States of New Mexico and Texas under which Pecos River waters will be equitably divided;

Construct such works and make effective such measures as are indicated by the investigations as necessary to accomplish effective control of salinity, erosion, silting, and floods.

Upper Rio Grande Basin.—The upper Rio Grande Basin, comprising an area of 34,000 square miles, occupies a portion of southern Colorado, a strip through central New Mexico from north to south, and a small portion of western Texas and northern Mexico.

Irrigation development in the valleys of this basin is such that practically all of the available water supply is now consumed on the more than 900,000 acres of irrigated land and an equal area of nonirrigated but water-consuming land that supports native vegetation. Future irrigation development is, therefore, largely limited to what may be accomplished by (1) salvage of waters now lost through nonbeneficial consumption by native vegetation; (2) stabilization of the water supply by storage regulation and control of flood flows, particularly in the San Luis Valley of Colorado; and (3) importations by transmountain diversions from the Colorado River Basin.

Adequate drainage in the sump area of the closed basin in Colorado and in the area of the Middle Rio Grande Conservancy District in New Mexico offers the major opportunity for salvage of waters now lost, and action looking to its accomplishment is needed.

Storage in the San Luis Valley to regulate the supply in keeping with the demand has long been sought but was prevented by interstate controversies. These difficulties have now been overcome by the ratification of the Rio Grande compact, under which the waters of the upper Rio Grande are equitably apportioned among the three States of Colorado, New Mexico, and Texas.

The San Luis Valley project, including Wagon Wheel Gap Reservoir, storage on the Conejos River, and the Weminuche transmountain diversion, has now been authorized and should be carried through to completion as expeditiously as possible.

The possibilities of importations from the Colorado River Basin were studied in connection with the Rio Grande joint investigation, and reports were presented on four transmountain diversion projects: San Juan-Rio Chama, Animas-Rio Grande, Weminuche Pass, and San Juan-South Fork Rio Grande. The San Juan-Rio Chama diversion offers the possibility of an importation of 350,000 acre-feet annually for use in the middle valley in New Mexico and, by exchange, in the San Luis Valley. Further studies looking to the early con-

struction of this diversion project, with adequate protection for present and potential uses in the San Juan Basin, should be made.

Silt and salinity problems are aggravated in the middle and lower sections of the upper basin. The silting of Elephant Butte Reservoir and much of the river channel above it and through the middle section is serious. Chief sources of silt are the western tributaries, Rio Puerco and Rio Salado. Erosion is taking a heavy toll of these watersheds. Flood-control surveys and investigations of the Departments of Agriculture and War should be completed and a plan of flood-protection works, well directed erosion-control measures, and effective watershed management, carried out.

Below Elephant Butte Reservoir, and particularly in the El Paso Valley, continued irrigation is threatened by an ever-increasing concentration of salt carried in the river's waters. A systematic program of water sampling and analysis and comprehensive investigations looking to the solution of this problem are urgently needed.

The possibility of ground-water supplies for irrigation in the San Luis Valley is such that a comprehensive survey to determine the quantity and quality of this source should be undertaken.

In the area of the Middle Rio Grande Conservancy District, aggradation of the river channel causing impairment of drainage works is only one of many problems besetting the district. Provision should be made for completion of adequate irrigation, drainage, and flood-protection works in the district.

The development of areas suited for wildlife refuges and the designation and control of areas best suited to recreational purposes should be accomplished as essentials in a well-balanced program of development.

Upper Colorado River Basin.—The Colorado River system, third largest drainage basin in the Nation, supplies water and electric power for domestic use, crop agriculture, mining, and manufacturing in Wyoming, Colorado, Utah, Arizona, New Mexico, Nevada, and California. Progress of the Colorado Basin States depends to a large extent on greater development and use of their water resources. To date, irrigation projects have been constructed on approximately 2,000,000 acres. More than 2,000,000 additional acres may ultimately be irrigated; 4,000,000 kilowatts of potential water power could be developed.

In this basin, problems of water control are varied and complex. Silting of reservoirs is the major long-range difficulty. About 500,000 tons of silt are deposited in Lake Mead behind Boulder Dam every day. Floods occur on many tributary streams. Dissolved salt content limits re-use of water drained from irrigated land and creates problems of salinity control.

Numerous communities and irrigated lands require supplemental water supplies.

The problem of formulating a comprehensive plan for the development and use of the waters of the Colorado River is complicated because the aridity of the land through which the river flows lends to its waters special significance and value, and because the river is both an interstate and an international stream. In the negotiations of the Colorado River compact, approved by six of the seven States involved, a start was made toward settlement of conflicting water claims and contests between States, and between smaller subdivisions. A treaty with Mexico and additional interstate agreements, however, must precede final settlement of controversies and full utilization of the river.

With respect to the upper Colorado River Basin, which includes the portion within the Mountain States region, the United States Bureau of Reclamation, cooperating with the States, is preparing a master plan of water development, using all information that is at hand and such additional information as can be gained through current surveys. It is essential that this plan of development be brought as near to perfection as possible within the next few years and that the States come to an agreement on it. The plan of comprehensive development will be greatly expedited by the Boulder Canyon Project Adjustment Act, passed by the Seventy-sixth Congress, which makes available to the Bureau of Reclamation funds for surveys and studies.

In the States of Colorado, New Mexico, and Wyoming are the upper basins of most of the streams that make up the Colorado River system; namely, the Green, Yampa, White, Colorado and tributaries, San Juan, Little Colorado, and Gila Rivers. These streams furnish water and electric power for crop and livestock agriculture, domestic uses, mining, and manufacturing. In 1930 the census reported that there were 1,140,000 acres of land irrigated from the Colorado River system in the three States.

Of all streams in the Mountain States region the Colorado River and its tributaries offer the greatest opportunity for future water development because of the existing water surplus on that stream. Not only the future development in the upper Colorado River Basin but that in other basins, such as the Bear, Platte, Arkansas, and Rio Grande, must therefore look to the Colorado River Basin surplus for much needed supplemental water supplies. The most important future uses of Colorado River waters will be the irrigation of lands within the basin, including the utilization of interbasin diversions; exportations by transmountain diversion to irrigate lands in adjoining basins; the generation of power within and without the basin; and uses for industrial purposes. Other uses and needs

such as for mining, recreation, domestic use, and grazing must be fully recognized and taken into account.

With respect to use of pasture lands for grazing, it should be emphasized that the livestock industry is now, and always will be, of great importance to the upper Colorado River Basin and to the entire Mountain States region. Even at present there is not sufficient summer feed to take care of the livestock population of the area. Therefore, in the development of any general plan for the upper Colorado River Basin, adequate consideration should be given to the provision of irrigation works to cover the maximum amount of pasture land that it appears practicable and feasible to irrigate.

B. Conserve Land Resources and Improve Land Usage

The prevailing use of land in the Mountain States region fits into a pattern peculiarly adapted to semiarid mountains and plains. In the valley lowlands, where temperature and soil are ideal for intensive farming, irrigated agriculture has developed. Adjacent to the irrigated districts, particularly in Colorado and Wyoming, is a large area of land that has been broken where dry farming is practiced extensively. On both the irrigated and nonirrigated farms, a livestock economy is generally indicated to be the safe type of farming from the standpoint of conserving the region's land resources.

Especially in the eastern part of the region, there is a large area of grassland interspersed with the cultivated land. In the mountainous sections, vast areas of public and private lands are used as summer range for livestock herds that are maintained in the irrigated valleys. Both the farm lands and these grazing lands, whether in public or private ownership, are intimately related and exceedingly important one to the other. Crops produced on the farms are essential to the efficient use of these grasslands.

These same forest and grassland resources are in turn, an absolute requisite to intensive agriculture because they provide a valuable watershed. Moreover, the timber products from the forest lands and the recreational opportunities that they provide aid greatly in making farming in the region both profitable and attractive. Without the one type of land use, the other would be extremely ineffective. With the two supplementing each other, however, a civilization has developed in the Mountain States region that is vitally important in the economy of the Nation.

The evolution of the present use of land in the region has not been as simple as a brief statement describing it. No definite plan was followed, no single code of laws governed, and no single well-conceived philosophy of development prevailed. Both public and private

policies and procedures have at various times failed to recognize the limitations of the resources. As a consequence, the use of land has been more or less unguided and, obviously, many mistakes have been made. From the standpoint of the ultimate use and conservation of the land resources, past mistakes must be corrected, present policies directed, and future actions coordinated by a well-designed program.

To conserve the land resources and improve their usage, it is necessary to—

1. Expedite the completion of topographic maps, by the appropriate Federal and State agencies, for inadequately mapped areas in the three States. Such maps are an essential prerequisite to water and land planning, and, to date, the maps for only a small portion of the region have been completed.

2. Expand research in watershed management, including study of the influence of vegetation on water yields and stream flow regulation. Extensive research has been started in the Platte and Colorado River Basins, and such studies should be extended into other basins to determine methods and effects of upstream engineering practices in flood and erosion control.

3. Protect watersheds, stabilize run-off, and reduce erosion and silting of reservoirs by maintaining forest and other vegetative cover, and by range management and other soil-conservation practices consistent with the preservation and maintenance of present and prospective water requirements of downstream water users.

Manage the forest and range cover on wild lands and perfect farming practices on agricultural lands so that accelerated run-off and erosion will be controlled and siltation of stream and river improvements reduced to a minimum. Management of the land to be directed to the realization of greatest beneficial multiple use of all resources.

Included in the stream basins where such protective and remedial measures are needed are the Yellowstone, Big Horn, and Powder Rivers, and lower tributaries of the Green River, in Wyoming; the Arkansas River and tributaries below Canon City, the Plains tributaries of the South Platte River, and the lower tributaries of the Colorado River, in Colorado; and the tributaries of the Rio Grande, and the Pecos River and tributaries, in New Mexico.

4. Obtain better balance between capacity of summer pasture lands and forage crops available for winter feed operations in the intermountain grazing areas. Improve the summer pasture lands by irrigation and soil conservation practices in such areas as the Little Laramie River Basin in Wyoming; North Park on the North Platte River, Middle Park on the Colorado River, the Gunnison River Basin, and San Luis Valley on the upper Rio Grande, in Colorado.

5. Set up procedures for and carry out a uniform classification of lands and soils. Classify lands of the region according to the most desirable uses from conservation, economic, and social standpoints, e. g., as for nonirrigated or irrigated crop production, timber production, grazing (domestic and wildlife), park and recreational areas, and convert the lands to those uses through gradual readjustments. Readjustments in land use, as between dry farming and grazing, are current problems in parts of Wyoming, eastern Colorado, and New Mexico.

6. Assist public and private land owners in realizing the most efficient use of their land. This includes reseeding, rodent and noxious weed control on range lands, restoration of fertility, improvement of cropping systems, and the efficient use of irrigation water.

7. Assist public and private land owners in making adjustments in land use, size of holding and ownership status to obtain more effective operation of the units involved.

C. Accomplish Greater Development and Use of Mineral Resources Thereby Expanding Industries and Creating New Ones

The Mountain States region occupies a unique position in the great variety and extent of its mineral resources, both metallic and nonmetallic. It is credited with having the largest reserves of bituminous and sub-bituminous coals, molybdenum, vanadium, and possibly zinc, in the United States. Large deposits of gypsum are known to exist in New Mexico and Colorado. Individually one or more of its States ranks among the four leaders in the production of feldspar, fluorspar, gold, manganese iron ore, sheet mica, lead, copper, potassium salts, sodium salts, sulphur ore, tantalum ore, tungsten, uranium and vanadium, and vermiculite. The cement industry is of importance, both in Colorado and Wyoming, and a relatively small area in southwestern Colorado extending into southeastern Utah has produced almost half of the world's radium supply.

While the region does not approach the leaders in petroleum production, nevertheless its petroleum industry is of great value to the region itself, and especially to New Mexico and Wyoming. In 1937, the gross returns from natural gas and petroleum alone were nearly \$74,000,000. Of the total proven oil reserves in the United States estimated as of January 1, 1940, 5.5 percent or 1,000,000,000 barrels are in the Mountain States region.

In 1937, the gross output from mining in the 3 States was more than \$180,000,000, so that this industry ranked next to agriculture in total production value. The potentialities for electric power and the region's abundant supplies of the fluxes and fuels needed in the

reduction of refining of its raw ores present a most favorable combination for the future of the mining industry. A substantial part of future development may be expected to come with the exhaustion of mineral deposits in other areas and within an increasing demand for minerals that are now submarginal.

To accomplish greater development and use of the region's mineral resources:

1. Complete comprehensive inventory and appraisal of the significant mineral resources of the region through appropriate State and Federal agencies.

2. Improve mineral reduction processes to render new and increased production economically feasible. Expand research in both metallic and nonmetallic fields, with particular emphasis in the latter field toward development and use of the region's great deposits of low-grade coal in competition with other fuels. Research directed toward the utilization of vast reserves of lignite and subbituminous coals, such as are found in Colorado, Wyoming, North Dakota, and South Dakota, is under way in a plant at Golden, Colo., and this should be continued.

Studies looking to the further utilization of the region's huge clay deposits may also be justified. Recent discoveries permit the economical processing of clays for the production of aluminum.

3. In the development of certain projects for supplementary irrigation supplies, large blocks of hydroelectric power will become available. Research should be started looking to the use of this and other power in electrochemical and electrometallurgical processes so that some of the region's minerals may be refined locally.

4. Develop deposits of (1) deficiency minerals now imported from foreign countries and (2) strategic, critical, and essential minerals with respect to the national defense. Included in both classes of minerals occurring in the region are: bismuth, cadmium, chromium, fluorspar, helium, manganese and iron manganese, mica, molybdenum, potash, titanium, tungsten, uranium, and vanadium. Other developments would result with improvement in the extraction of gasoline from oil shale and heavy sulfur oils.

In Colorado, the production of manganese, mica, and tungsten presents fields for important development. The State now produces over 70 percent of the world's molybdenum supply. Here, the development of manganese is dependent in large part upon the drainage of known combined deposits of zinc, lead, and manganese.

In Wyoming, the Casper and other regions offer some possibilities for the mining and milling of chromium and the Green River Basin, for the production of potash and phosphate. This State has large iron and bentonite deposits that are already being used, and uses may be found for the large titanium iron deposits found there.

Potential sources of carbon dioxide exist in Colorado and New Mexico for the production of dry ice, and in New Mexico the continued development of extensive potash, copper, natural gas, and oil deposits is of first importance; likewise there are promising manganese and iron manganese deposits.

5. Through cooperation and regulation determine practicable methods and bring about more effective conservation and utilization of the region's petroleum and natural gas.

6. Continue research looking to the development of economical processes for the utilization of the region's oil shales and its huge deposits of low-grade coal in the production of petroleum substitutes. Much work has been done along these lines, and such utilization may become largely a problem of economics.

**D. Improve and Expand Recreational Development
Thereby Increasing Income and
Other Local and Region-Wide Benefits**

The Mountain States region has in its climate and scenery a natural resource of incalculable value, one that provides recreation for thousands of visitors and gives rise to the region's third largest industry—an industry that does not cause a depletion in the resource itself. It is estimated that nearly 6,600,000 out-of-State motorists visited the 3 States of the region in 1939 and that they spent over \$162,000,000 while there.

Principal attractions are the mountains, lakes, streams, wildlife, forests, and flora. Camping, hunting, fishing, mountain climbing, skiing, and other outdoor sports may be enjoyed in areas remote from or close to the cities and towns. Within the region are included, in whole or in part, 33 national forests, 19 national monuments, and 5 national parks. Figures for 1939 show that Shenandoah National Park and the Great Smokies in the heavily populated eastern district led all others in total number of visitors, but Rocky Mountain National Park, in Colorado and Yellowstone National Park in Wyoming ranked third and fourth.

Particularly in Wyoming and to a lesser extent in Colorado and New Mexico, dude ranching has proven to be a very profitable endeavor, and the Indian lore found throughout New Mexico, in Mesa Verde and other parts of Colorado, and in Wyoming is especially attractive to tourists.

Notwithstanding its wide popularity, the Mountain States region has much more to offer than is common knowledge, and one of the most important factors in immediate recreational development is the wider dissemination of reliable information on the opportunities that are offered.

Excellent railway and airway service makes the recreational advantages of the region more readily available to people living in the East and on the Pacific

coast; it opens possibilities for the flow of winter sports traffic to ever more popular sports areas in the high Rocky Mountains.

The National Park Service, the Forest Service, State, and local agencies have done and are doing much to develop the recreational attractions of the region; however, recreational development has only begun. There is need, therefore, for long-range planning of this development. Objectives and action programs, as essential elements in such planning, are:

1. Through cooperative Federal-State surveys, expand the inventory of existing nonurban recreational facilities to include all potential recreational features of the region. This should include a determination of possibilities for the development of local week-end- and day-use areas that would provide recreational opportunities for people living in the eastern plains and other rural districts.

2. Expand facilities for outdoor recreation in State and local, as well as national areas; improve parks and recreation areas, preserve scenic attractions, unique geological formations, primitive or wilderness areas, and historic sites, all with due regard to multiple use of the region's resources. This implies proper coordination of the use of land and water resources for recreation with other uses, and a careful consideration of proposed park and national monument expansion to the end that a distinction be made between areas where water conservation, grazing, and mineral development may be paramount and those areas where the recreational features and preservation of scenic attractions are dominant.

3. Provide additional recreation facilities to satisfy the increasing demand for winter sports.

4. Establish parkway connections, where practicable, between major recreational areas, and as approach routes between population centers and outlying recreational areas.

5. Provide ample shore areas above high water in planning water storage sites potentially valuable from a recreational standpoint, to permit sound recreational or wildlife development and to insure controlled public use rather than restricted private use.

6. Preserve fishing grounds and fish life: by specifying minimum storage contents, discharge from the upper water levels, minimum discharge, and headgate screening, insofar as this is possible on irrigation developments; by urging cooperation of State and Federal agencies in working out project plans for structures on potential fishing streams; by eliminating where possible pollution of waters inhabited by game fish; by conducting surveys to determine the economic fish life propagation value of waters in high areas and what lakes and streams should or should not be made accessible by trail or highway.

Secure rights-of-way along suitable fishing streams for public use and discourage the present trend of closing and posting fishing waters.

7. Continue provisions for proper studies to determine the history, habitat and environment, population, ecological relationships, and other factors that are necessary for the proper management and conservation of wild game; likewise continue acquisition of lands that are proven to be necessary for winter grazing of wildlife.

8. Distribute more widely reliable information that will acquaint prospective visitors with the recreational opportunities, facilities, and expense involved in visiting areas throughout the region.

II. Expansion of Commerce, Industry, and Employment

In the Mountain States region, the value of foreign and domestic exports exceeds that of the imports. Commerce here is largely concerned with the movement out of the area of the products of agriculture, mining, and lesser industries, and movements into the region of manufactured products.

As compared to a national average value added by manufacturing of \$192 per capita in 1937, the average for the region was only \$62 per capita, and less than \$20 per capita in New Mexico. It is important that studies be initiated to determine the region's potentialities in industrial development and marketing; that insofar as possible the region should process more of its raw products for local use; and that it should expand industries for the refining and reduction of more of its ores and agricultural products before shipment out of the region, all directed toward the development of a better economy, with less dependence on the basic industries of crop agriculture, stock raising, and mining.

Employment in the region's agricultural, mining, and manufacturing industries fluctuates widely. In agriculture, it varies with the crop seasons and with production; in mining, the demand for metals causes changes in production and employment, and especially in the coal mines, seasonal variations apply; in the limited field of manufacturing, labor needs vary particularly in the sugar-beet refining, steel production and manufacturing, and meat packing industries.

To expand commerce, industry, and employment action is needed to:

1. Make detailed investigations of present and potential power markets for hydroelectric and other power that can be developed throughout the region. (See also sec. I, A, 6.)

2. Conduct surveys to determine: Existing manufacturing plants in the region, including the source of raw materials used and markets for their products; possibilities for new manufacturing plants that might

be developed to use existing raw materials; possible outlets for finished products; and a historical analysis of attempts to establish manufacturing plants which have failed in the region and the reason for their failure.

3. Promote participation of the Federal Government and the States in institutes of business, engineering, and labor research at appointed State universities or colleges, in the interest of small enterprises that cannot organize and maintain their own research. Provision should be made for central coordination of such institutes.

4. Encourage the establishment of local manufacturing and industrial development that will provide off-season employment for mining, agricultural, and part-time manufacturing communities. Many possibilities in this field will be opened when larger quantities of hydroelectric power are made available.

5. Complete aerial timber surveys and initiate economic studies to determine present use, source and volume of imports, and possible future production of native timber. Based on these studies and under sustained-yield management, expand lumber production to supply a larger percentage of local requirements.

6. Encourage the establishment of marketing cooperatives and improve methods and practices of distributing and marketing the region's goods.

7. Expand local industrial development to supply more manufactured articles for local consumption, using raw materials produced in the region, thereby expanding employment and creating a better integrated economy.

III. Improvement of Facilities and Service

A. Study and Analyze Transportation—Develop and Improve Transportation Systems and Facilities

In the Mountain States region, as in most areas, there has been a lack of proper coordination of transportation by air, rail, and road. Before such coordination can come about, it will be necessary to determine the role of each mode of transport and the adequacy or the over-development of facilities for each. It is desirable from the public's viewpoint that duplication of services be overcome insofar as possible and that terminals, warehouses, railroad yards, and facilities for the collecting and distributing of goods be coordinated to furnish better services at lower cost.

In many areas, rail lines have been abandoned, and adequate highway facilities could not or have not been supplied. In others, railroad branch lines are operating at a loss and could very well be replaced with a cheaper form of transportation. The distribution of highway funds is becoming a problem with respect to mainte-

nance, and active cooperation upon the part of Federal, State, and local agencies will be needed to work this problem out satisfactorily. Added emphasis must continue to be placed on the secondary system of highways.

Every effort should be made to bring about a plan for the development of air transportation and facilities through the cooperative efforts of the various interests concerned, especially the municipalities and the State governments.

The following objectives and action programs are indicated:

1. Participate in Nation-wide survey and analysis of the problems of transportation in all fields and appraise factors peculiar to the Mountain States region.

2. With respect to highway transportation, complete master plans through the cooperative efforts of local, county, State, and Federal agencies, utilizing highway planning surveys; proceed thereunder with the construction of grade separation structures, the realignment and surfacing of unsatisfactory segments, and the construction of new sections, especially on the main feeder systems to the major routes.

Similarly, improve access to mountain recreation areas and provide better transportation facilities for mining and agricultural districts, particularly where abandoned rail lines have not been followed by adequate highway construction.

Expand equipment to maintain open roads in the mountainous regions where the volume of through traffic and winter sports travel will justify the cost.

3. Effect needed control of highway corridor to regulate undesirable commercial development and roadside advertising. Accomplish this objective through zoning or other roadside regulation such as scenic easements. A recent enabling act permits district and county zoning in Colorado; similar enactments are desirable in New Mexico and Wyoming.

4. Continue participation with the Federal Government in planning and constructing a system of major highways and connecting routes in the interest of national defense. Reconstruct major routes to meet adequate standards for heavy military equipment.

5. Through the cooperative efforts of Federal, State, and municipal governments, provide a plan and develop thereunder a well-integrated system of airports, landing fields, airways, and aids to aerial navigation, which will serve as a means of national defense and take care of ever-increasing scheduled air-carrier operation and nonscheduled private flying.

Provide quick access to airports from downtown business districts.

Secure the enactment of zoning laws through cooperative efforts of States, counties, and cities, to provide protection to airports from encroachment of

obstructions to flight and to establish the proper use of areas adjacent to the airports.

Through cooperation and regulation, prevent traffic hazards that would result if auxiliary or training fields were constructed in close proximity to terminal airports.

6. Encourage the establishment of new industries locally for the production of aircraft and aircraft equipment, if in accord with the best interests of national defense and other major considerations.

B. Improve Character of Small Town and Suburban Development

1. Prevent unsightly, uneconomic, and insanitary urban fringe development and preserve open-type suburban development by extension of planning and development control into unincorporated areas. To this end, secure adoption of master plans and zoning ordinances for counties, and control of subdivisions in the vicinity of urban centers.

2. Stimulate and aid small towns and communities in the better planning and development of their public facilities and utilities, and in harmonizing local and regional development, through assistance from State, county, and regional planning agencies.

C. Improve Conditions of Sanitation and Health, Abate Stream Pollution, and Insure Safe Water Supplies for Towns and Cities

Although the Mountain States region is noted for its healthful climate and much has been accomplished to improve standards of health, the development of the public-health program is still in an early stage. Progress in this regard in the Rocky Mountain States has probably not kept pace with many other areas because of lack of facilities, the wide distribution of the population, and the inadequacy of local health organizations. No endeavor is more worth while than that of protecting and improving our human resources, and every encouragement should be given to the development of a well-organized public-health program in the counties and local areas.

In the past several years the percentage of total urban population served by approved sewage-disposal systems in Colorado has increased from 4 percent to 84 percent, over 90 percent is served in New Mexico, and a much lesser percent in Wyoming. Continued cooperation in this field is necessary on the part of State departments of public health and municipalities in order that a sound program may be established and maintained.

Similar progress has been made in the field of municipal water supplies, although many of the towns and a few cities still do not have adequate water-treatment plants; others are in need of supplemental supplies;

and some need new supplies altogether. Special emphasis should be placed upon the education of rural families with respect to the dangers of unimproved domestic water supplies, as the death rate from water-borne diseases is far above the national average in many counties.

The need for an improvement in the health and working conditions of industrial workers has been emphasized by recent national-defense activities, but even under peacetime activities, more thought and energy should be devoted to industrial hygiene.

To improve public and personal health:

1. Create a genuine interest in health problems through education of the individual, family, and community.

2. Enact State legislation to permit the establishment of county or district health units where local sponsorship is not possible.

3. Increase hospital facilities in rural areas particularly through cooperatives or by other means; encourage the organization of additional maternal and child-health clinics; and meet the increasing demand for public-health nursing. This will include services to the indigent and migrants, for whom provision should be made.

4. Reduce the incidence and mortality from tuberculosis through a continuing program of public health departments, by education, by dissemination of information, by research and clinical diagnosis, and by increasing facilities for hospitalization of the tubercular indigent and transients.

5. Expand mental health service to meet increasing needs and attempt to combat this serious problem by establishing and maintaining child-guidance and mental-hygiene clinics, and by providing for continuing contacts with patients, under competent supervision.

6. Through legislation, modernized health regulations, and education of the public, secure more effective means of enforcing milk sanitation. Promote the adoption of the United States Public Health Service milk ordinance by the cities and counties.

In the field of sanitation and domestic water supply:

1. Proceed with the construction of sewage-treatment plants to alleviate pollution conditions and to remedy the present contamination of irrigation waters, especially those that are used for truck gardening. Investigate methods of treating sewage for conserving its fertilizer value and determine methods for its use.

2. Prevent the pollution of stream waters by mine tailings and industrial wastes.

3. Follow an aggressive campaign for the establishment and maintenance of adequate and safe water supplies for all towns and cities; likewise promote the education of rural people concerning the hazards of using

untreated surface waters for drinking and culinary purposes.

4. Bring about a mutual understanding between health departments, industry, and labor with respect to the importance of eliminating or controlling certain industrial health hazards.

D. Improve Living Conditions by Providing Better Housing for Low-Income Groups

The needs of the region with respect to sanitation and health are of no more importance perhaps than its need for better housing—actually, it is difficult to segregate the problems of health from those of housing. Better housing is needed in the rural as well as in the urban districts. Until recently, very little attention had been given to this field, and before much can be done, additional studies are required to determine more exactly what the housing needs are and the people must be given a better understanding of housing as it relates to their general health and welfare.

Due to the past several years of depression, many urban families have moved to outlying districts where rent was more reasonable or where they could build a small home. Their number has been added to by rural families who had to give up their farms due to economic conditions and drought. Some of this development has been creditable, but on the whole, there has grown up adjacent to many of our cities and towns an uncontrolled type of development that is causing many of the municipalities much concern, since there is no way of controlling sanitation and health in these areas. The solution does not lie in the removal of "shacks," or altogether in the passage and enforcement of zoning restrictions, building codes, etc.—rather, low-cost housing that will meet minimum standards must be made available for these people and those within the cities, through individual effort, and private or public enterprise. Recent surveys in one city in the region indicate that over 25 percent of the dwellings there are substandard with respect to construction and health facilities.

Much can be done to control future urban and urban fringe housing developments through county zoning laws, building codes, health laws, but sight must not be lost of the fact that many of the people cannot afford anything but minimum standard homes.

With respect to rural housing, the greatest needs in Colorado and Wyoming are probably for migratory camps for transient labor, and homes for resident farm laborers in sugar-beet, potato, fruit, and truck-crop districts.

In New Mexico the migratory laborers working in the cotton, broomcorn, and truck-crop harvest need better housing facilities. With respect to permanent rural families, however, the problem of providing adequate

housing is complicated by the fact that many of these families have such small units of land that they cannot produce a living from them. Rehabilitation or resettlement of these people should probably be considered before very much is done toward improvement of their housing.

Construction activities in providing better housing will furnish employment, stimulate industry, remove or improve slum districts, provide opportunities for private investment, and improve the health and happiness of the urban and rural populace.

The following objectives and action programs are indicated:

1. By education in planning and construction and in the use of local building materials, by adequately secured loans, and by grants where necessary, assist the industrious rural family to rehabilitate itself and improve its housing and sanitation conditions.

2. Construct migratory labor camps to improve bad sanitation and health conditions in the heavy fruit, melon, potato, and sugar-beet raising districts. The death rate from filth-borne diseases in these areas is far above the national average.

3. Initiate studies to determine the need for low-income housing in cities and towns and, where necessary, provide new modest residential properties to fill the most urgent needs of these groups.

4. Reconstruct or rehabilitate the poorest residential areas in the larger cities to improve the general living and health conditions of the people living in these areas. Likewise, in blighted commercial districts, many of which include residential properties, bring about the rehabilitation of these districts with a consequent increase in public revenues and a lessening of the decentralization trend in the city.

IV. Development and Protection of Human Resources

The protection and promotion of the welfare of the people comprising a nation or region are the sole ends of organized national life. Natural resources, industrial institutions, and all forms of social endeavor are valuable only insofar as they contribute to the well-being of the people. The development and protection of human resources is, therefore, a matter of primary importance.

The population of the Mountain States region in 1940 is 1,894,270, distributed by States as follows:

Colorado.....	1, 118, 820
New Mexico.....	528, 687
Wyoming.....	246, 763

This represents a density of only 5.8 persons per square mile as compared to a national average of over 44. More than 97 percent of the total population is of the white race, 7 percent being of Spanish-American decent.

Dominating the metropolitan areas is the city of Denver with a population in 1940 of over 318,000; other cities in order of size are Pueblo, and Colorado Springs, Colo.; Albuquerque, N. Mex.; and Cheyenne, Wyo.

In 1930 the region included nearly 640,000 workers of age 10 and over, distributed by occupational types as follows:

Occupation of workers, age 10 and over, Colorado, New Mexico, and Wyoming, United States census, 1930

Type	Number of workers	Percent
Agriculture.....	195, 763	30. 7
Manufacturing.....	115, 211	18. 1
Trade.....	74, 275	11. 7
Domestic and personal.....	60, 867	9. 5
Transportation.....	57, 814	9. 1
Professional service.....	49, 065	7. 7
Clerical.....	38, 860	6. 1
Extractive minerals.....	30, 809	4. 7
Public service.....	12, 048	1. 9
Forestry and fishing.....	3, 210	0. 5
Total.....	637, 922	100. 0

Particularly with respect to agriculture, the region is faced with problems of caring for transient labor. Unemployment is a problem in many agricultural and mining communities. Stock feeding helps to round out the employment of farmers and farm laborers, and coal mining in the winter helps to counteract somewhat the fluctuations in metal-mining employment.

An unemployment census taken in 1937 showed the following distribution of those who registered at that time:

	Number	Percent
Totally unemployed.....	65, 458	49. 0
Emergency workers.....	31, 630	24. 0
Partially unemployed.....	36, 668	27. 0
Total.....	133, 756	100. 0
Total in percent of 1940 population.....		7. 1

More and more attention is being and must be given to the interrelations and interdependence of natural resources, the people, and the institutions. For the people, it is important to give more thought to the significance of (1) personal characteristics—age distribution, sex, nationality, birth rates, death rates, attitudes, and values; (2) education, skills, religion, and cultural attributes, such as music, arts, crafts, literature, etc.; and (3) the family health, food, clothing, shelter, comfort, convenience, taxes, and income.

For the institutions, the long-range plan of the region should include schools, churches, health facilities, libraries, communication facilities, government at all of its levels, recreational facilities, credit institutions, and marketing and trading facilities.

Much additional information is needed to define more clearly the nature of the problems involved

before long-range plans for these may be formulated. Recreation, sanitation and health, housing, and marketing and trading facilities have been treated elsewhere in this plan. In this section discussion of problems and statements of objectives are confined to the interrelated fields of education, youth, and personal welfare.

Much of the problem of conservation of human resources is related to the situation in which urban and rural boys and girls now find themselves. During the past 10 years there has been an increase in the competition for positions in productive industries in the region. The succession of youth to places of responsibility in industry has been retarded by the fact that persons in the older age brackets have not been able to accumulate a competence that would permit them to retire. Urban boys and girls are reaching their majority without having established themselves in productive industry. In the betterment of these conditions, there is need to:

1. Establish State-wide and county-wide library systems through use of facilities offered by the Work Projects Administration and National Youth Administration.

2. Introduce a better testing technique into the school systems for the purpose of getting information concerning aptitudes and attitudes of boys and girls for use in vocational guidance.

3. Increase present facilities for vocational training with special emphasis on the needs of industry and the national-defense program.

4. Provide a more adequate program of outdoor and indoor recreation with proper supervision. This includes the creation of more youth camps and the introduction of keener interests, through competition, in games which can be conducted with little money or equipment, particularly in rural areas.

5. Establish both rural and urban forums or planning groups, which will permit boys and girls to take a more active part in planning the long-range programs which affect them, including conservation and development of natural resources.

6. Widen, insofar as possible, the sphere of influence of such organizations as the 4-H Clubs, Boy Scouts, glee clubs, symphonies, and bands.

7. Continue and expand educational work in the Civilian Conservation Corps and the National Youth Administration.

8. Initiate studies looking to the further consolidation of rural schools, including the cost of maintaining the individual schools, cost of providing transportation, and logical consolidation areas.

In the field of adult education:

1. Promote adult education programs and extension courses, utilizing the universities, the extension services, National Youth Administration, Work Projects Administration, and health organizations.

2. Establish rural and urban forums for the discussion of public, farm, health, and other related questions.

3. Expand vocational opportunities to adults in need of rehabilitation and assist them in finding employment.

PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN PACIFIC SOUTHWEST: REGION 8, BERKELEY, CALIF., 1940

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Report of the Pacific Southwest Regional Planning Office

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FOREWORD

Since the days of early settlement, countless individuals and groups have been planning more or less independently for the development of the Nation and its regions. Farmers surveyed the land, laid out their farms, and planned their crops. Prospectors discovered minerals and planned their extraction. Industrial managers planned their factories and output. Although cities, farms, industries, institutions, and physical improvements were not charted in advance, nevertheless they are the resultant of the aspirations and plans of all the people, acting individually or in independent groups.

While these myriad plans were aimed primarily to provide individual incomes, they were also directed more or less consciously toward building prosperous and enduring communities and States. To further these common interests, public agencies and private groups were organized to study the natural resources of land, forests, water, and minerals and to aid in conserving and developing them for the use and benefit of the people. For many years Federal, State, and local agencies and private organizations have been continuously engaged in making and carrying out plans for better use of our natural assets.

In order to present an over-all picture of the possibilities for further development in each region of the Nation, the National Resources Planning Board asked its nine regional field offices to submit a summary report setting forth desirable objectives and lines of action for future progress. This is the report for the Pacific Southwest.

Such an over-all summary has been made possible by the studies and work of the numerous agencies and organizations that have for years been investigating resources, problems, and possibilities of the Pacific Southwest. The Geological Survey and State departments dealing with water and minerals have long been engaged in investigating the region's water and mineral resources and assembling the data needed for their development. The Corps of Engineers, in cooperation with State and local agencies, are studying harbors and rivers, and recommending programs and projects to regulate stream flow, prevent floods, and improve navigation. The Bureau of Reclamation has built many of the large irrigation projects in the Pacific Southwest, and, together with State engineers and local organizations, is making investigations and preparing construction plans for future irrigation projects.

The Forest Service, working with State forestry departments, local officials, and private timber opera-

tors, has prepared programs for multiple uses of forest lands and sustained-yield management. The Soil Conservation Service, Farm Security Administration, Agricultural Adjustment Administration, Bureau of Agricultural Economics, and other divisions of the Department of Agriculture are cooperating with State agricultural services and local groups throughout the region to reduce erosion, conserve soil, and aid farmers to hold their land. Through the work of State and county agricultural and land-use planning committees, detailed programs for improving land use are evolving. The Grazing Service, Fish and Wildlife Service, and National Park Service are cooperating with the Southwest States in planning for development of range lands, fish, wildlife, and recreation areas.

The agencies mentioned above are only a few of the numerous organizations and groups that have been actively engaged in planning for development of the Pacific Southwest.

The statement of objectives and recommendations for action given below is an attempt to present a consensus, incorporating the judgment and opinion of representative agencies, organizations, and individuals in the Pacific Southwest States, that would outline a broad plan for future development. The statement is not presented as a comprehensive plan but as a summary of the kinds of action that would lead to integrated and balanced growth. The purpose of this outline is not to lay down hard and fast lines that must be rigorously followed, but to provide a broad framework that will be filled out by detailed programs and projects designed to meet local conditions and needs.

This plan in outline is a composite product assembled from information, published reports, advice, and suggestions obtained from numerous agencies, organizations, and individuals in different parts of the region. Informal conferences, reports of State planning boards, and meetings of the five Pacific Southwest drainage basin committees held during the last 5 years supplied the basic data for many recommendations. A preliminary draft of this report was prepared by the staff of the field office of the National Resources Planning Board in Berkeley, Calif., and submitted for criticism to representatives of more than 75 agencies and organizations in the Pacific Southwest, most of whom reviewed the draft, forwarded valuable comments, and suggested many revisions. The comments and suggestions have been carefully considered and incorporated, as far as practicable, in the statement that follows.

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

PACIFIC SOUTHWEST

The Region and Its Potentialities

For almost a century, adventurous Americans have looked to the Pacific Southwest as a land of opportunity. The days of quick riches from mining, agriculture, and real estate are apparently over, but westward migration continues. The region has the essentials for greater growth and progress—large natural resources, and the manpower, equipment, and ability for expanding industry and improving conditions for living. A hundred years of settlement and development, however, have substituted new opportunities and new problems in place of the old.

The region is no longer a virgin land awaiting exploration and settlement. The era of rapid growth is being succeeded by a period of consolidation, of filling in of gaps in the economic structure, and of more intensive use of available resources. Scientific discoveries and improvements in methods and organization make possible innumerable types of new developments and industries. Continued population growth, although slower than in former decades, is creating more business and demands for better facilities and services.

The Pacific Southwest, comprising the States of Arizona, California, Nevada, and Utah, covers 460,000 square miles, one-seventh of the Nation, and has about 8,000,000 people, one-sixteenth of the national population. During the last decade, the population grew nearly three times as fast as that of the Nation. California, which has 85 percent of the region's people, alone gained 1,200,000 residents, chiefly through migration from other States.

A vast storehouse of natural resources, the region has one-fifth of the Nation's undeveloped water power, one-eighth of the remaining forest acreage, and one-third of all land in parks and recreation areas. On the other hand, more than half of the Nation's semi-arid and waste land is in the Pacific Southwest.

About 60 percent of the region is semiarid. Agricultural croplands, the most productive land use, comprise only about 11,000,000 acres, or 3.8 percent of the total area. This is far below the national cropland average of 21.8 percent. In 1935, farm lands, including croplands, pasture, and farm woodlands, comprised only 18.4 percent of the Pacific Southwest, compared to 55.4 percent for the Nation. Although the region has but one-fortieth of the Nation's farm population and croplands, its crop production is valued at one-eighth of the national total. Despite the scant rainfall and poor quality of much of its soil, the Pacific Southwest stands high in the production of livestock,

citrus fruits, orchard crops, and vegetables. High productivity has been achieved through irrigation and other efficient agricultural practices on the comparatively small cultivated area.

Forests cover nearly one-fifth of the region and contain about 240,000,000 board feet of timber. An important range livestock industry is dependent upon the herbaceous and shrubby vegetation on most of the area for year-long or part-time grazing of domestic livestock. These forests and range lands are also the habitat of wildlife. Its mountains, coast, and magnificent scenery provide rest and recreation for visitors from all parts of the Nation. The United States Travel Bureau estimates that in 1939 tourists visiting Grand Canyon National Park and other attractions spent \$25,000,000 in Arizona. In the same year, California received over \$275,000,000 from tourists who came to enjoy its climate and scenery.

The Pacific Southwest yields about one-half of the Nation's gold and silver production, two-thirds of the copper output, one-fourth of the lead, one-seventh of the petroleum, and one-eighth of the zinc. It also produces large quantities of other minerals.

The economy of the Pacific Southwest is based to a large extent on extraction and sale of raw materials derived from its natural resources. Crop production, livestock raising, and mining are the principal basic activities in Arizona, Nevada, and Utah. California, however, has well-diversified manufacturing and a wide range of commercial and service activities. In 1929 the value added by manufacture per capita was \$247 for the Nation, and \$220 in California, but only \$108 in Utah, \$89 in Nevada, and \$64 in Arizona. Most of the region's manufacturing is concentrated in three industrial areas—in and around Los Angeles, San Francisco, and Salt Lake City.

The region is a land of wide variety and sharp contrasts. Its diversity of climate, physiography, resources, population characteristics, agriculture, and industry is conspicuous. Here are both Mount Whitney, the highest elevation, and Death Valley, the lowest point, in the United States. Between the metropolitan centers of Los Angeles, San Francisco, Reno, Phoenix, and Salt Lake City lie vast stretches of uninhabited desert. California has nearly the lowest birth rate in the Nation, while Utah has the highest rate of natural population increase.

In the Pacific Southwest, the struggle against nature is continuous and intense. Most of the region is arid and inhospitable, and human habitation is dependent

on conserving the scant and erratic rainfall. Without modern engineering, intensive development would not have been possible. Cities, farms, mines, and factories depend directly on perpetuation of their water supplies, which must often be brought from distant sources. The desert is ever striving to recapture the territory that has been wrested from it. Maintenance of the region's economy requires constant preparedness and defense against adverse forces—against destruction of forests and watershed cover, damage by floods and drought, erosion of soils and beaches, shoaling of bays and harbors, lowering of underground waters, silting of reservoirs, and salting of land.

Future Outlook

While the general trend of growth and development in the Pacific Southwest continues upward, conditions vary in different localities. Some communities are expanding rapidly, others remain stationary, and a few are declining. Although the general standard of living is almost the highest in the Nation, at least one-fourth of the families in the region have incomes of less than \$1,000 a year. Most of the working population is gainfully employed, but thousands of newcomers are unable to find jobs or land on which they can make a living.

The Pacific Southwest can support a larger population at a higher average standard of living. It can contribute more to the national culture and income. From the long-range view, its growth has just begun. Earnings can be increased by providing and marketing more goods and services. More workers can be employed, seasonal fluctuations in employment lessened, and the proportion of unemployed reduced. The health of the people can be improved and better care provided for the ill and infirm. Educational facilities can be enlarged and extended, highways can be made safer and better housing made available for low-income groups.

Workers can have more free time, and the drudgery of labor lessened, by greater use of the abundant energy resources. Less than one-fifth of the region's potential hydroelectric power has been put to work. More than 10,000,000 kilowatts of additional power could be generated. California's large reserves of petroleum and natural gas, although subject to heavy draft, are far from exhaustion. Utah's coal and oil shales can supply fuels for a hundred years.

The acreage of irrigated land could be doubled and crop production greatly increased when needed. With better forest protection and sustained-yield management, more than 3,000,000,000 board feet of lumber could be produced annually without depletion. Present production averages about 2,000,000,000 board feet a year, and in many localities, the timber stand is being completely destroyed by clearcutting, fires, insects, and

tree diseases. Range lands can produce more livestock if overgrazing is prevented and cover restored.

The region has enormous mineral reserves. Output of copper, silver, quicksilver, lead, and zinc could be greatly increased. In time of war, the deposits of chromium, manganese, and tungsten can lessen the Nation's dependence on foreign imports of these strategic metals.

The Pacific Southwest will continue to grow, to use more of its resources and manpower, and to expand and diversify its business and commerce. Future growth, however, should avoid repeating the waste and errors of the past and be directed toward sound and enduring development.

Basic aims for the Pacific Southwest, like those for the Nation are—

To create greater economic opportunities and security for present and future population;

To produce a larger income more widely distributed among the population;

To make available for the people more and better goods, facilities, and services.

Plans for Future Development

To aid in achieving these goals, the framework of a broad plan for future development of the Pacific Southwest is outlined below. Like all aims for the future, the outline will necessarily be clarified, extended, and revised to meet conditions that arise. The recommendations presented are by no means complete or intended to exclude others that may be necessary.

To show desirable types of development in different fields, the outline is presented in three interrelated sections:

Section I. Better use of natural resources.

Section II. Expansion of manufacturing, commerce, and employment.

Section III. Improvement of public and private facilities and services.

Action recommended under section I is designed to build a solid foundation for future progress by greater conservation and use of natural resources. More water would be made available for agriculture, industry, power generation, and growing communities. Vital water supplies would be perpetuated, soils and forests conserved, and better land use established. Agriculture would be more efficient, and forest industries would have permanent timber supplies. Larger settlement opportunities would be created for the oncoming generation of young farmers and for newcomers seeking farms on which they can make a living. Greater incomes would be obtained from the region's recreational attractions, and more people would enjoy the benefits of outdoor recreation. Mineral production would be increased and strategic minerals provided for national

defense. Petroleum and natural gas would be produced more efficiently. Fish resources would be built up so that commercial fisheries would be preserved and sport fishing maintained.

Plans outlined under section I aim to provide a broader and more enduring base on which a larger and stronger economy can be built. Programs presented under section II are directed toward increasing incomes and employment through greater production of manufactured articles and more efficient distribution of goods and services. Diversified industrial development would increase economic security and create a better balanced and more closely integrated economic structure.

Action outlined under section III would improve living conditions by providing better facilities and services for the people of the region. Various forms of transportation would be integrated, transportation costs reduced, and highway travel made easier and safer. Blighted urban areas would be rehabilitated and future urban development guided into desirable patterns. Greater benefits would be obtained from future investments in public works. The level of public health would be raised, air and water pollution abated, and domestic water supplies improved. Housing deficiencies would be reduced and substandard structures replaced by up-to-date dwellings. Educational facilities would be enlarged and educational opportunities on all levels extended.

The specific goals set forth in the following pages can be achieved only through the cooperative efforts of public agencies, private organizations, and individual citizens. Federal, State, and local governments, working with private enterprise, can initiate and carry out many programs that will conserve natural resources and make them available for wider use. Governmental agencies protect forests, control floods, keep rivers and harbors open for navigation, build and maintain highways, develop water supplies, and construct large engineering projects that provide water for irrigation. Because of the nature and size of the works that must be built, development of many natural resources requires action by public officials and investment of public funds. But, the initiative and enterprise of private individuals and organizations are indispensable in putting resources to use and in producing and distributing goods and services.

While the broad plan outlined herein indicates desirable patterns for future development, continuous planning and coordinated action are essential for accomplishment. Further planning is required to determine how objectives may best be achieved, to reconcile conflicts that will arise, to work out details of proposed undertakings, and to take into account the effects of each development on others that may be contemplated. Organization and machinery should be created that

will provide for continuous over-all planning, for correlation of programs and projects of Federal, State, and local agencies, and for harmonizing public and private efforts.

I. Better Use of Resources

Although continual progress is being made in conservation, misuse and neglect of resources are causing economic losses. Water is the economic life-blood of the Pacific Southwest, but in many localities present supplies are inadequate for increasing demands. Eroded and depleted lands, destruction of watershed cover, loss of forests by fire and improper logging, waste of natural gas, diminution of fish and wildlife are apparent. The base supporting the region's economy is being nibbled away.

1. Put More Water to Work

More water is essential for the economic progress of the Pacific Southwest. Not only does this region have the lowest average precipitation per square mile, but many streams that are raging torrents in winter and spring are bed-dry the rest of the year. Surface water is seldom available when needed, but must be stored and carried to farms and cities. Because of the unequal distribution of rainfall, water must often be diverted from one basin to another.

The region's scant and variable water supplies can be completely developed only by comprehensive and integrated programs of investigations, legislation, and project construction that will provide for maximum use and reuse of surface and underground waters in each drainage basin. These integrated plans are gradually emerging through the cooperative efforts of representatives of Federal, State, and local agencies on drainage-basin committees in studying the potentialities and needs of each basin and outlining procedures for correlated development of water and land resources.

Continued surveys and investigations are needed to provide additional information and data on precipitation, run-offs and streamflow, quality and quantity of surface and underground waters, topography, and river profiles. Additional annual snow surveys are required so that accurate forecasts of irrigation water supplies can be made. In certain areas, special investigations should be made to determine the origin, movement, and deposition of silt, and the effects of forests and other types of vegetative cover in controlling run-off. Flood-control investigations and studies of potential dam sites and costs of water-control projects must be continued. Research into improved methods for applying irrigation water to different soils and crops should be continued.

In the Pacific Southwest, floods are unusually destructive. Sudden, intensive rainfall on steep, sparsely

vegetated slopes causes widespread damage. More flood control works are needed. Construction of new residences in flooded areas should be prevented. In California, present laws permit flood-plain zoning, but in Arizona, Nevada, and Utah enabling legislation for this purpose should be enacted.

Overdrafts on underground supplies have dangerously lowered water tables in central and southern California and in certain sections of Arizona and Utah. Laws governing the use of underground water in Arizona and California should be clarified and amended to provide adequate regulation of water use. Voluntary agreements should be fostered among water users for equitable distribution of available surface and underground waters.

Full development of water resources will require construction of many large multiple-use projects, such as the Boulder Canyon project on the Colorado River, the Central Valley project in California, and the Salt River Valley project in Arizona. Such projects are more than mere reservoirs. They are key developments required for regulating stream-flow, reducing flood damage, and making water available for irrigation, industrial and domestic use, and for generating power. The manifold benefits obtained from such multiple-purpose improvements justify construction of many projects that would be uneconomic if built for a single purpose.

Principal water problems and kinds of developments needed in the five major drainage basins of the Pacific Southwest, irrespective of State boundaries, are as follows:

Colorado Basin.—The Colorado River system, third largest drainage basin in the Nation, supplies water and electric power for domestic use, livestock, agriculture, mining, and manufacturing in Wyoming, Colorado, Utah, Arizona, New Mexico, Nevada, and California. Progress of the Colorado basin States depends to a large extent on greater development and use of their water resources. To date, irrigation projects have been constructed on approximately 2,000,000 acres. More than 2,000,000 additional acres may ultimately be irrigated. More than 4,000,000 kilowatts of potential water power could be developed when needed.

In this basin, problems of water control are varied and complex. Silting of reservoirs is the major long-range difficulty. An average of about 300,000 tons of silt per day are deposited in Lake Mead behind Boulder Dam. Floods occur on many tributary streams. Absorption of alkali limits reuse of water drained from irrigated land and creates problems of salinity control. Numerous communities and irrigated lands lack adequate water supplies, particularly the Salt River Valley and Coolidge Valley areas in Arizona.

Efficient development of Colorado Basin waters

requires an interlocking system of storage reservoirs, located and built to control run-off and regulate stream-flow. Multiple-use projects are needed that will—

Provide additional water for irrigation projects and communities now suffering from inadequate supplies; also for new lands that can be irrigated economically;

Alleviate silting of reservoirs. Further investigations are needed to determine best means for erosion prevention in the plateau areas drained by the Virgin, Little Colorado and San Juan Rivers above Lake Mead. These areas contribute only 10 percent of the water, but about 75 percent of the silt in the lower Colorado. Similar investigations are needed on the Williams-Big Sandy Rivers above Parker Dam, and the effects of soil conservation practices on run-off and stream-flow, particularly in the upper Gila River drainage area, should be investigated;

Control floods, particularly in vulnerable areas of the Gila, Salt, San Juan, Virgin, Williams-Big Sandy, Queen Creek, Little Colorado, Freemont, Price, and Uncompahgre Rivers and in the Grand Valley area in Colorado;

Provide more low-cost hydroelectric power throughout the basin and supply future demands after output of Boulder Dam is absorbed.

Because of limited water resources in the Pacific Southwest and Mountain States regions, the relative benefits from expansion of irrigation and other water uses within the Colorado Basin and those from exportation of water to areas outside the basin must be considered. Economic studies of land, forest, vegetation, mineral, and recreational resources of the basin are needed so that water development can be correlated with expansion of irrigation, grazing, lumbering, mining, recreation, and manufacturing within the watershed of the Colorado River and with exportation of water to areas outside the basin.

Course of action: Pending completion of the basin plan—

Establish agreements between Federal agencies and the Colorado Basin States for future development of water, land, mineral, and recreational resources;

Complete the comprehensive plan for development of the Colorado Basin provided for in section 15 of the Boulder Canyon Project Act with funds made available by the Boulder Canyon Project Adjustment Act, effective May 31, 1941;

(See also discussion of problems, potentialities, and recommendations for development of the upper Colorado River Basin in the report of region 7.)

Great Basin.—The Great Basin, covering most of Nevada, western Utah, and parts of Oregon and California, has the lowest mean annual run-off in the Nation, only 3.5 acre-feet per square mile. Practically all stream-flow has been appropriated. Less than one-

third of the 2,000,000 acres in existing irrigation projects has adequate water supply. Salt Lake City, Ogden, and other cities suffer from recurring water shortages. Supplemental supplies are imported from the Colorado Basin, and additional importations are needed.

Destructive floods occur frequently in many localities, especially along the Wasatch front in Utah and on the eastern slopes of the Sierra Nevada Range. Erosion on watershed lands is causing sedimentation on downstream areas.

Opportunities for further development of water resources are limited not only by the scant precipitation and small stream flow, but also by the dearth of suitable reservoir sites and by the hazards from floods and sedimentation. Action is required that will provide more water for irrigation, stock raising, and domestic and industrial uses.

Course of action:

Construct multiple-purpose projects, such as the Pine View project in Ogden Canyon.

Construct small reservoirs and develop springs and wells to provide additional water supplies for domestic use and for livestock, similar to projects being built by the Grazing Service.

Construct water-spreading works, develop underground water supplies, and regulate their use.

Improve water-use practices, especially reduction of water losses through wasteful irrigation and seepage from canals and conduits.

Where economically feasible, develop mountain lakes and streams for multiple purposes of irrigation, power generation, recreation, and wildlife.

Investigate possibilities for reducing flood damage and obtaining additional supplies through storage on the Walker, Truckee, Carson, Humboldt, Sevier, Provo, Weber, and Ogden Rivers.

Northern California Klamath Basin.—This basin supplies water and hydroelectric power for domestic use, agriculture, mining, lumbering, and other industries in northwestern California, and in Klamath County, Oreg. It has the highest average precipitation of any basin in the Pacific Southwest, and its resources are still largely undeveloped.

The basin has large redwood, pine, and fir forests, which can support a permanent forest industry if operated under sustained-yield management. Harbors at Crescent City, Eureka, and other points permit ocean transportation for lumber and other products. Agriculture can be expanded by providing more supplemental irrigation during the dry months. Installed hydroelectric capacity totals only 65,000 kilowatts, but more than 2,000,000 kilowatts could be generated. Salmon fishing is a major activity on the Klamath River, and California laws prohibit construction of dams that would interfere with the valuable salmon runs.

However, plans might be developed that would both preserve fish life and permit power generation. Income from recreation, already substantial, can be increased by greater development of recreation attractions.

Course of action: Complete investigations required for a comprehensive long-range plan for coordinated development of land and water resources that will—

Provide more water for irrigation, domestic, and industrial use;

Provide low-cost electric power and supply future power demands;

Provide for propagating and conserving fish life in such manner that both multiple-purpose dams may be constructed and valuable fish resources preserved;

Maintain harbors and provide improvements required for ocean navigation;

Conserve and develop land and water for recreation purposes.

California Central Valley—Central Coast Basin.—Major problems in this basin are inequalities in distribution of water, insufficient surface water for irrigation, serious depletion of underground supplies, intrusion of salt water in the delta area, damage from recurring floods, and shortage of water for domestic and industrial use in the San Francisco Bay region.

To overcome these difficulties, the State of California has prepared a long-range State water plan for control and use of water throughout the basin, of which the Central Valley project is the key unit. It is the first step toward full control and efficient redistribution of water resources throughout the basin. This project will confer great economic benefits by maintaining agriculture and expanding industry in this highly developed basin. Of the 3,000,000 acres now irrigated, 1,000,000 acres face acute water shortage.

Course of action:

Complete the Central Valley project now under construction by the Bureau of Reclamation in cooperation with the State of California. This project will regulate stream-flow, protect valuable bottom lands above Sacramento against floods, and generate about 300,000 kilowatts of low-cost power at Shasta Dam. It will supply water for municipalities, agriculture, and industries in the upper bay region, reduce salt-water intrusion in the delta area, and improve navigation on the lower Sacramento River. Sacramento River water will be conveyed to lands in the lower San Joaquin Valley, replacing San Joaquin River water that will then be diverted to lands needing supplemental irrigation supply in the upper San Joaquin Valley.

Construct additional multiple-purpose water-control projects, as rapidly as needed, under the California State water plan on the Feather, Yuba, American, and other rivers to reduce flood damage and provide additional water supplies and future power generation.

Replenish underground water supplies through more percolation areas and spreading-grounds, such as those developed by the Santa Clara Valley Water Conservation District.

Southern California coastal basin.—

Although one of the most rapidly growing areas in the Nation, this basin has only 1 percent of California's water supply. To supply industrial and domestic needs, water and hydroelectric power are imported from the Colorado River and the Great Basin.

Intensive irrigation has made this one of the Nation's richest agricultural areas. About 650,000 acres are irrigated, chiefly from pumping of underground supplies. Because of intermittent stream flow, hydroelectric power cannot be generated in any appreciable quantity.

Watershed protection, flood control, and maintenance of underground supplies are the major problems. Although every large stream is dry most of the year, sudden and severe floods cause heavy damage. In many places, continued overdrafts have lowered groundwater tables below economic pumping lifts. To some extent, salt water is intruding into irrigation supplies.

Course of action:

Complete flood-control program of the United States Corps of Engineers and the Department of Agriculture. Correlate watershed-protection, flood-control, and water-conservation programs of Federal, State, and local agencies through an integrated water plan.

Develop additional spreading grounds to replenish ground water and to conserve run-off and prevent salt-water intrusion.

Continue necessary dredging of harbors and other improvements required for maintenance of navigation at ocean ports.

Increase Electric Generating Capacity.—Consumption of electric power is rapidly increasing in the Pacific Southwest. Besides the large demands from normal growth, expansion of national defense industries is fast absorbing existing generating capacity. Ample supplies of low-cost electric energy are essential for greater industrial development.

For northern California, it is conservatively estimated that a minimum of 80,000 kilowatts additional capacity annually will be required. At this rate, the 300,000 kilowatts to be provided by Shasta Dam in 1944 will be absorbed within 4 years thereafter. Further increase in shipbuilding and other defense activities may create still greater demands.

Future increased generating capacity required for southern California, Arizona, and Nevada is estimated at 150,000 kilowatts per year. While the increased demands during the next 5 years will probably be supplied by additional generators at Boulder Dam and by construction of stand-by steam plants at Los Angeles, Glendale, and Burbank, the Bullshead project

on the Colorado River should be completed and in operation by 1944.

Surveys for transmission systems that will be required to distribute power from Shasta Dam and other projects should be started immediately so that necessary transmission networks will be ready when dams are completed.

2. Conserve Land Resources, Improve Land Use, and Preserve Water Supplies

Land and water conservation are inseparable. In critical areas, particularly southern California and many parts of the Colorado Basin, maintenance of watershed cover is of utmost importance for perpetuation of water supplies. Present protection in these areas is inadequate. Destruction of forests, overgrazing, and soil erosion are endangering water sources and causing serious damage to cultivated lands, storage reservoirs, and irrigation works along the Colorado River and its tributaries. Once denuded, the highly erodible soils are easily washed away. An adequate program of watershed protection requires not only protection of forests and other cover but also better land-management practices—soil conservation, prevention of overgrazing, and construction of upstream protection works.

The basic problem of land use—of obtaining the maximum continuing income and at the same time preserving land resources—is intensified by the large proportion of semiarid land in the region. While the land resources of the Pacific Southwest have generally been developed for constructive purposes, numerous readjustments in land use are required. Much progress in conservation has already been made through the work of Federal, State, and local agencies and individuals, but more intensive efforts and closer cooperation are needed.

To perpetuate water supplies, improve land use, and provide a stable foundation for agriculture, livestock raising, lumbering, and manufacturing in the Pacific Southwest, land-conservation programs of Federal, State, and local agencies should be continued, enlarged, and correlated. Not only should land be used for the purpose for which it is best suited, but conservation practices should be followed in using the land and its cover.

Course of action:

To expedite needed land-use adjustments and to promote better land-management practices—

Reduce erosion through soil conservation and readjustments in land use. Put cropland subject to severe erosion in soil conservation districts. Enact enabling legislation authorizing soil conservation districts in Arizona. Restore vegetative cover on submarginal lands retired from cultivation. Regulate cultivation

Good Pasture Land Typical
of Many Parts of The
Great Basin



Thinly-Covered Slopes,
Characteristic of Eastern
Section of The Great Basin
Where Brush Spreaders
Have Been Built To Ret-
ard Run-Off

Small Rubble Banks Con-
structed To Prevent
Storm Water From Back-
ing Up Into the Meadow
Shown in the Background



Courtesy of Soil Conservation Service

FIGURE 2.—Examples of Land and Water Development in The Great Basin

on steep slopes. Protect highway cuts and fills from erosion by planting or other effective means;

Protect beaches by acquiring and administering under public ownership ocean shoreland subject to severe erosion, and regulating construction of jetties, breakwaters, and bulkheads;

Correlate watershed protection with downstream control structures. Construct upstream works that have proved effective in reducing erosion. Continue field studies to determine best methods of watershed protection and upstream control. Continue present control of hydraulic mining in California to prevent silting of streams and destructive debris;

Increase protection of forests, brush, and other cover against uncontrolled fires, particularly in critical areas, such as southern California and central Arizona. Greater protection against forest fires is especially needed on State and private lands, and also on some Federal lands. Fire protection funds should be increased as authorized under the Clarke-McNary Act;

Increase protection of trees against insects, white pine blister rust, and other diseases, particularly in the pine region of northeastern California, where continuing depletion on 3,000,000 acres in Lassen, Modoc, Shasta, and Siskiyou Counties, Calif., is threatening industries dependent on pine forests. Encourage selective salvage logging of high-risk trees by private timber operators on both public and private forests under control methods and plans developed by forest conservation agencies;

Put forest lands under sustained-yield management to perpetuate timber supplies. Encourage owners of private forest lands to practice selective cutting by approved logging methods. Establish more forest-management units providing for multiple use of forest lands for watershed protection, timber production, grazing, recreation, and wildlife, similar to the management program proposed for timberland adjacent to Diamond Spring, Calif.;

Put more range land in regulated grazing districts, or under sustained-range management. Restore depleted ranges by restricting grazing of livestock to the capacity the land can support, constructing small dams, water-spreading projects, and stock watering places, and reseeding with forage grasses;

Put valuable forest and range lands that cannot be adequately protected or economically operated by private owners under public ownership through purchase, exchange, or other equitable methods. Acquire in Federal ownership lands within national forest boundaries on which conservation is not practiced by private owners. Approximately 50,000 acres of redwood forest in Del Norte and Humboldt Counties, Calif., should be acquired for research and as a demon-

stration area for good forestry practices in heavy virgin timber stands. Another area of approximately 100,000 acres of lighter redwood timber in Mendocino and Sonoma Counties, Calif., should be acquired for similar purposes;

Encourage blocking together and unification of land ownerships. Retain tax-abandoned forest lands in State ownership for reforestation, protection, and management for multiple uses. Establish county forests on rural woodland areas, especially near cities. Clarify mining laws to eliminate mining claims in critical watershed areas;

Adjust production of forage crops for winter feed to the livestock-carrying capacities of adjacent grazing areas. Where economically feasible, increase use of farm-grown forage crops for livestock feed to reduce intensity of grazing on depleted range lands. Lands uneconomical for crop production, may often be economically developed for pasture by proper seeding. Expand research in protection, management, and economic uses of forest and range lands, including studies of possible new or larger uses for forest products. Continue research in San Dimas Experimental Forest, San Joaquin Range and Black Mountain Experimental Forests;

Continue programs for employment of youth in conservation of lands and forests;

Continue and expand cooperative land-use planning by Federal, State, and county land-planning committees. Classify rural lands according to desirable long-time uses, and convert the land to such uses through rural land zoning and other acceptable corrective measures. Enact legislation providing for classification and zoning of rural lands in Arizona, Nevada, and Utah;

Establish legal ownership of tax-reverted lands. Distribute equitably assessments on rural lands, and adjust property taxes to incomes the lands can produce. Change taxing methods tending to force wasteful use of land to methods that will encourage conservation of land resources.

3. Maintain Agricultural Productivity and Increase Opportunities for Farm Settlement

Through irrigation, crop specialization, and intensive use of mechanized equipment, the Pacific Southwest has developed a highly productive agriculture. Further expansion of the region's cropland is limited by market demands for agricultural products and by the availability and cost of water for irrigation. Creation of larger settlement opportunities depends on development of lands that can be economically irrigated and on more intensive use of present crop acreage.

The Soil Conservation Service estimates that, when

justified by economic demands, about 7,000,000 acres of new land can be brought under cultivation in the region through extension of irrigation and soil-conservation practices. Ultimately, a half million or more acres of uneconomic cropland should be retired from production and converted to other uses.

While the specialized agriculture of the Pacific Southwest produces high yields per acre, improvements can be effected by organizing production in units of more economic size and gradually supplanting some of the present crops, such as dry-farmed wheat, by others more suitable to the land and climate. On many farms, improvements can be made in organization and management, and in production and marketing of crops.

Thousands of extra workers are required during certain seasons, but opportunities for year-round employment or farm settlement are limited. As a result, seasonal migrations of farm workers and the continuous influx of newcomers seeking employment in agriculture create difficult problems.

Primary needs are to maintain soil fertility, improve and stabilize agricultural land use, and create larger opportunities for farm settlement and more stable employment in agriculture.

Course of action: Where economically feasible, construct water-control projects described under subsection 1 to provide more water for irrigation, and open up new lands for farm settlement—

(a) Where additional supplies are required in areas now under irrigation;

(b) Where new irrigated lands may be brought under cultivation at such a rate that the prices of agricultural products will not be adversely affected;

(c) Where such supplies, either for land now under irrigation, or lands to be brought under irrigation, can be provided at costs that can be repaid from agricultural income.

Develop and settle large irrigation projects constructed by the Bureau of Reclamation and other agencies under cooperative plans for land use, farm organization, crop production, community development, roads, schools, and other necessary facilities, similar to comprehensive plans being prepared for the Columbia Basin project in Washington.

Conserve resources and stabilize farm communities by employing rural workers during off seasons in constructing small land and water conservation projects, and in developing forest, range, wildlife, and recreational resources. Expand the water facilities program of the Department of Agriculture, in providing assistance to farmers and ranchers, particularly those with low incomes, in the development of wells, stock tanks, the rehabilitation and repair of small irrigation facilities, and the construction of small storage reservoirs.

As more cropland becomes available, encourage and aid farm families now stranded on submarginal land in the region to settle on new land.

Preserve soil fertility by crop rotation and other soil-conservation practices. Retire lands on which erosion and soil depletion cannot be economically arrested.

Encourage farmers to reduce excessive use of irrigation water; prevent waterlogging of land and flooding of crops. Continue the work of the Department of Agriculture in installing water-saving devices and informing farmers of improved irrigation practices.

Continue soil-conservation and farm-rehabilitation programs. Encourage farmers to help themselves by extending financial and technical aid in voluntary cooperation in crop-rotation, soil-conservation, and crop-marketing programs.

Continue purchases and distribution of surplus agricultural products to persons on relief.

Encourage establishment of part-time farms in stable mining and lumbering areas, or adjacent to urban centers, where nonfarm employment can regularly be obtained during part of the year.

Encourage voluntary organization of farms into cooperative production units providing for common ownership and use of mechanical equipment and breeding stock too costly for purchase by individual operators.

4. Obtain Larger Incomes and Greater Benefits From Recreation and Wildlife

The Pacific Southwest is endowed with extensive and varied recreation areas, many of which are scenic wonders of national importance, protected and administered by the Forest Service, National Park Service, and State park agencies. The parks and scenery of the region are lucrative sources of income. Numerous potential recreation areas, however, are still undeveloped. Although acreage devoted primarily to recreation has nearly doubled in the last decade, the possibilities of obtaining larger incomes and greater human benefits from outdoor recreation have not yet been recognized. Properly developed, recreation areas are an inexhaustible resource, capable of returning continuous incomes year after year.

Conservation for recreation, however, does not mean that other potential benefits from land and water resources must be lost. Programs for protection and development of recreation areas in the Pacific Southwest must take into account other possible uses so that valuable minerals, water supplies, and power will be available for development. Likewise, plans for land and water development should include maximum provisions for recreation consistent with other economic

uses. On the other hand, in establishing parks, monuments, and recreation areas on land possessing superlative scenic attractions, nonconforming uses that would destroy or depreciate recreation, historic, scenic, or scientific values should be excluded.

Course of action: Acquire and develop more public recreation areas. Provide a great diversity of outdoor attractions and make these accessible throughout the region to persons at all income levels.

Complete recreation development programs of State park commissions and county agencies. Make into public parks tax-reverted lands that are valuable primarily for recreational and scenic purposes.

Provide and maintain more low-cost facilities and services for recreation, especially accommodations for eating, sleeping, and swimming. Provide adequate drinking-water supplies, sanitary facilities, and parking space. Large populations in and around metropolitan areas lack sufficient parks, picnic grounds, and public beaches that can be easily reached and enjoyed at small expense. Rural families living in agricultural oases surrounded by barren deserts should also have more opportunities for enjoying cool mountains, forests, and seashores during the hot summers.

Make more forests available for recreation by providing additional camping grounds properly protected against fire hazards. Flat or gentle slopes provide desirable locations for camping or picnicking spots, while rougher ground may be advantageously used for summer homes. Small, isolated tracts may often be converted into attractive city or county park and camp sites.

Develop more youth camps and winter-sports areas. Where conditions permit, develop ski trails and other winter-sport facilities.

Establish more regional parks and parkways, similar to the East Bay regional parks, accessible from the metropolitan areas of Los Angeles, San Francisco, Salt Lake City, Phoenix, and other cities.

Acquire and develop for public use more ocean-beach lands, particularly south of Santa Barbara, Calif. Develop small-boat harbors, recreation areas, and wildlife refuges at esteros and lagoons along the California coast.

Preserve unique scenic attractions and geological formations, archeological remains, and historic sites.

Preserve roadside timber stands along the region's scenic highways.

Protect roadsides by zoning or other legal measures against despoliation and defacement. Eliminate hazardous and unsightly advertising signs and ramshackle structures. In constructing new highways, include adequate protection of scenic values, and develop roadside parks wherever feasible.

Develop as a national recreation area the Escalante wilderness and scenic territory along both sides of the

Colorado River, from Grand Canyon National Park to Moab, Utah, and Labyrinth Canyon on the Green River, provided adequate guaranties can be obtained for future development and use of water, land, and mineral resources within the area by private enterprise as well as by Federal, State, and local public agencies.

Acquire and develop the following outstanding recreation areas for public use:

In Arizona: Meteor Crater and Tonto Natural Bridge.

In California: Redwood park extension in Big Basin and Butano forests, San Mateo and Santa Cruz Counties; redwood forests in Humboldt and Del Norte Counties; South Calaveras Grove Big Trees, Tuolumne County; petrified forest in Napa County.

In Nevada: Hudson Fossil Field, Lovelock Caves, Beowawe, Mindon, and other hot springs, and Virginia City, as a national historic site.

In constructing dams and reservoirs, such as Shasta and Friant Dams, provide for recreation use of the impounded waters and adjacent areas, similar to the recent development of Lake Mead behind Boulder Dam. Include necessary studies for this development with preliminary economic and engineering investigations for such projects.

Distribute more widely among the people of the region and the Nation reliable information concerning opportunities for different kinds of outdoor recreation in the Pacific Southwest, together with information on the facilities available, and the cost of visiting different areas.

Because of the increasing proportion of older persons in the Pacific Southwest, expand facilities for adult recreation, and develop community programs for recreational activities.

Hunting and fishing attract thousands of tourists, but the region's forests and range lands could support a much larger wildlife population in certain areas. Thinning species of wild game, birds, and sport fish should be replenished by more scientific protection, artificial propagation, and adequate stocking. On the other hand, excessive concentrations of certain species of game are causing serious difficulties in critical localities, particularly the concentration of deer and elk on winter ranges. A scientific game-management program is needed that will preserve healthy game populations and proper wildlife balance.

Course of action toward this end:

Protect wild animals, birds, and fish by establishing more wildlife refuges and more effective conservation measures. In developing land and water resources for other uses, provide all feasible protection for wild game, birds, and fish. Small improvements in the form

of check dams and water-spreading devices are valuable aids in preserving and restoring wildlife. Where water is diverted, range lands should be reseeded with grasses and other forage plants to provide feed for livestock, wild animals, and birds. Revise game laws of the hunting and fishing season and limits of catch and kill as needed for better protection of wildlife.

5. Develop Mineral Resources To Aid National Defense and Maintain Mining Industries

The Pacific Southwest is the custodian of vast stores of minerals, including strategic metals for national defense—chromium, manganese, mercury, and tungsten. California has the Nation's largest chromite deposits and extensive deposits of manganese ore. Although the ores are of comparatively low grade, considerable quantities of these two metals could be mined in an emergency. Other deficiency minerals imported from foreign countries—antimony, vanadium ores, molybdenum, graphite, talc, and barite—are also found in this region.

The region supplies a large part of the Nation's output of gold, copper, silver, quicksilver, and lead. Non-metallics produced in commercial quantities are cement, iodine, pumice, peat, sodium salts, borates, slate, arsenous oxide, sulfur, bromine, and fluorspar.

Mining normally produces one-half or more of the basic income derived from extractive and manufacturing activities in Arizona, Nevada, and Utah. Many communities depend solely on mining. As high-grade ores become exhausted, development of lower-grade deposits will become increasingly important for maintenance of the mining industry.

Course of action: Encourage development of strategic materials for national defense and allocate public funds to acquire adequate reserve stocks. Foster continued development of strategic minerals by loaning funds at low interest rates to mine operators.

Continue exploration and investigation of mineral occurrences, especially of deficiency minerals now imported from foreign countries, to determine more completely the quantity, quality, and properties of known deposits.

Expedite completion of topographic and geologic maps of unmapped areas in the region.

Aid development by making more water, electric power, and transportation available to mineralized areas. The increasing availability of large blocks of low-cost water power creates opportunities for new mineral industries. Investigate possibilities for establishment of reduction plants and mineral industries through use of low-cost power from Boulder and Shasta Dams and future hydroelectric projects.

Expand technical research and experimentation in improving methods for treating and processing Pacific Southwest minerals. Establish experimental and pilot plants to demonstrate the commercial feasibility of improved methods of processing and treatment, particularly reduction of ores by electrochemical and electrometallurgical processes.

Continue and expand research in production of new byproducts and new uses for present byproducts from minerals found in the region.

6. Improve Methods of Producing Petroleum and Natural Gas

California has about one-sixth of the Nation's known underground reserves of petroleum and a large proportion of the natural gas. In Utah, Colorado, and Wyoming, five times the present known petroleum reserve producible from the Nation's oil fields are locked up in oil-bearing shales. Utah also has enormous beds of low-grade coal; Carbon County alone contains many billion tons.

Since 1929 petroleum production in California has been prorated to some extent by voluntary agreement, under umpires selected by oil producers. This voluntary control has been helpful in preventing overproduction and stabilizing prices. Further regulation of petroleum production, however, would make voluntary agreements more effective.

While there is little evidence that petroleum is needlessly lost or wasted due to technical inefficiency, more wells are still being drilled than are needed. Unit operation of oil fields permitted by California law should be extended. Unit operation means the development as a whole of a geological unit according to a definite program, with royalties shared on the basis of acreage, oil in place, or some other equitable arrangement irrespective of the location of producing wells.

Since 1929 wastage of natural gas in California has been reduced. Because oil and gas are produced together, gas losses are difficult to overcome completely.

Course of action:

Enact State legislation establishing production quotas for zones, properties, and wells in each oil field, through a comprehensive system of proration of oil production in California.

Establish a national policy and conservation program, supplementing State legislation, to regulate production and export of petroleum throughout the Nation.

Encourage the unit plan of operation of oil and gas fields.

Curtail further gas wastage by intensive repressuring and storing in the ground. Encourage production and marketing of liquefied natural gas.

Continue scientific research and extensive inquiry to determine practicable methods for more effective conservation and utilization of petroleum and natural gas. On the basis of these studies, adopt a long-term conservation plan that will point the way toward more efficient utilization of the region's energy resources.

Investigate methods for recovering higher percentages of oil from natural deposits.

Develop economical processes for utilization of the region's oil shales and low-grade coal.

Wherever economically feasible, substitute energy generated from water power for consumable fuels that can be preserved for future use.

7. Preserve and Build Up Commercial Fisheries and Sport Fishing

Commercial fisheries and sport fishing in California's coastal waters and streams produce large incomes. California leads the Nation in value of commercial fish products. Sport fishing in the mountain lakes and streams of Arizona, California, Nevada, and Utah are important tourist attractions.

Many species of fish life, however, are rapidly dwindling, particularly sardines, mackerel, and salmon. Stream pollution, dams, irrigation ditches, diversions of water, unregulated ocean trolling, and overfishing by both commercial and sports fishermen are the principal causes of depletion. Everyone seems to have water rights except fish. To perpetuate commercial fisheries and communities dependent on commercial and sport fishing, the fish resources of the Pacific Southwest should be further conserved and built up.

Course of action:

Make biological studies of fish life concurrently with preliminary engineering investigations for proposed dams and water-control projects, so that adequate conservation measures can be provided before structures are built.

Where economically feasible in construction of dams and control works, provide ladders or other means by which migratory fish in coastal rivers may reach their spawning grounds. On irrigation and power diversions, provide suitable screens to keep out young fish. Endeavor to maintain sufficient water flow in spawning streams and trout-fishing areas.

Continue and expand research by Federal and State agencies to determine effective means for perpetuating various species and runs. Continue the cooperative research projects of the fish and game commissions and the Fish and Wildlife Service.

Regulate off-shore fishing along the Pacific coast by enacting necessary legislation, interstate compacts, and treaties with Mexico and Canada, based on scientific surveys and studies.

II. Expansion of Manufacturing, Commerce, and Employment

The Pacific Southwest in general exchanges agricultural foodstuffs and low-priced raw materials for manufactured goods produced elsewhere. Many of its natural assets of metals, minerals, petroleum, forests, and top soil are gradually being liquidated to pay for shoes, refrigerators, automobiles, and other needed articles.

Moreover, a large part of the income derived from natural resources in Arizona and Utah does not remain in the region but accrues to residents of other areas who own the mines and land from which the wealth is taken. Some of this wealth is returned to the Pacific Southwest in the form of wages to workers, dividends, taxes, reinvestment of capital, Government payments, and expenditures by tourists. But these together return less than the value extracted.

Employment in the region's agriculture, lumbering, and mining is highly variable. In agriculture, it fluctuates with the crop seasons. In mining, it varies from year to year, depending on the demand for copper, silver, lead, zinc, and other minerals. Similar fluctuations occur in lumbering.

The slowing down of population growth and the reduction of exports to foreign countries are forcing a gradual shift from an economy based on the extraction and sale of raw materials to a broader economy better organized to produce finished goods and to distribute them among the regional and national population. Employment is increasing in distributive and service activities throughout the region and the Nation and will probably continue to increase as new appliances requiring continual repair and servicing are developed.

Future industrial growth in the Pacific Southwest will be determined not only by developments within the region, but also by those in the rest of the Nation and the world. Policies and programs of the Federal Government will have an important bearing on economic expansion, both by their direct local effects and by their indirect effects on the national economy. Programs for industrial development in the region must, therefore, be correlated with those for other regions and for the Nation as a whole.

Economic Objectives

To increase incomes and buying power, and provide more stable employment for its growing population, the region should strive for a better balanced economy, in which, as far as possible, the advantages both of specialization and of diversification would be retained and harmonized for more efficient production and greater stability. Extractive activities, such as mining,

agriculture, and lumbering, particularly in Arizona, Nevada, and Utah, should be supplemented with more processing and manufacturing industries wherever they can be economically established.

Course of action:

Expand industries for national defense under a comprehensive plan that would meet all military requirements and also strengthen the economic structures of the Pacific Southwest and of the Nation as a whole. Increase industrial output by locating industries so that resources available in each region would be used most effectively.

Continue construction of works that would facilitate and foster larger use of the varied natural resources of the region, many of which are not now fully developed.

Expand programs for conserving and rebuilding soils, forests, and range land to perpetuate employment and industries dependent on these resources. Further development of land and water, particularly low-cost hydroelectric power and extension of power transmission and distribution systems, should create opportunities for new factories.

Endeavor to lower costs of distribution, stimulate trade, and widen markets by improving and coordinating transportation facilities. (See sec. III, Transportation).

Encourage establishment of new key industries, such as electrochemical and electrometallurgical plants, that would induce development of subsidiary industries to provide special services and convert semifinished products into finished goods. Key industries tend to create expanding economic spirals. The Nation's industrial plant requires continual improvement to overcome obsolescence. In modernizing and rebuilding the Nation's factories, opportunities should arise for establishment of new plants in the Pacific Southwest to serve western markets.

Wherever economically feasible, encourage expansion of commodity-producing industries that would manufacture more finished articles from local resources for consumption within the region. For example, frozen food processing plants might be established in certain agricultural areas.

Endeavor to increase the value of commodities shipped out by more intensive manufacturing and processing before shipment. For example, instead of shipping range animals to distant processing plants, develop more livestock packing plants within the region.

Encourage, likewise, the establishment of local manufacturing and processing industries that would provide off-season employment in agricultural, forest, and mining communities. Investigate possibilities for establishment of local industries in new irrigation areas soon to be open for settlement.

Aid financing of desirable industries, particularly those that would help balance and integrate the regional economy, by loan of public funds at low interest rates. Investigate the extent to which taxes and restrictive regulations are retarding industrial development.

Encourage establishment of marketing cooperatives with adequate protection of individual stockholders to aid distribution and marketing of Pacific Southwest products, particularly agricultural and forest products. For example, cooperative marketing of lumber in forest areas might enable small timber owners to develop their holdings.

Continue and expand research by public agencies and private organizations into possibilities for establishment of new industries throughout the region. Such research should point out advantages offered by local resources, fuels, power, labor supply, transportation facilities, potential markets, and other factors. Recent development of highly efficient electrically operated industrial units of small size offers possibilities for establishment of new industries in areas where raw materials are insufficient to justify investment in large factories. As an example, small electric furnaces have recently been built in California to manufacture reinforcing bars from scrap steel. Although these plants are of small capacity, their efficiency enables them to compete with mills of larger size. Small electric smelters for reducing metallic ores may often be established in localities where limited mineral deposits are available. Recent technological developments in lumbering offer similar opportunities for efficient small operations in forest areas.

Provide necessary authority, organization, and funds for studies by the Federal Government, in cooperation with State and local agencies, of prospective industrial uses and markets for water and power to be supplied by large public works, including the electric power generated at Boulder and Shasta Dams and future power projects, similar to the research program of the Bonneville Project Administration.

Establish State industrial development commissions to cooperate with public and private organizations in fostering desirable industrial expansion and distributing reliable information concerning economic opportunities and potential markets for prospective industries.

Investigate declining industries and those that are using up or losing their basic resources to determine what can be done to keep them in operation, or to transform them into industries that can operate successfully.

Reduce labor turn-over and fruitless migration within the region by determining seasonable labor demands in different localities and improving methods for supplying workers by employment services.

Integrate agriculture and industry through the catalytic action of modern science. Continue and expand research at the Western Agricultural Research Laboratory into industrial uses for the wide variety of crop and animal products raised in the Pacific Southwest. Foster industrial research to develop new uses for byproducts now wasted.

III. Improvement of Public and Private Facilities and Services

Transportation

The agriculture, industry, and commerce of the Pacific Southwest depend on long-distance transportation. Because of the region's great area and distance from eastern markets, low-cost transportation is vital to its economy. Transportation costs are a heavy burden. Residents of the region pay the freight on purchases of practically all commodities manufactured outside the region. At the same time, many of the region's producers indirectly absorb freight charges on shipments of their raw materials to outside markets because they must sell their products at delivered prices in competition with producers closer to market centers. Lowering of transportation costs would increase buying power and encourage expansion of agriculture and industry.

While the region is served by all types of modern transportation, these facilities can be welded into a more efficient system. In certain localities, present services are inadequate. In others, wasteful and costly duplication exists. Highway trucking, especially, can be better correlated with railroad transportation, each furnishing the type of service for which it is most efficient. Terminals, warehouses, railroad yards, and facilities for handling goods can be coordinated to furnish better services at lower cost.

Course of action:

Lower costs and improve services by coordinating railroad, waterway, highway, pipe-line, and airplane transportation under a comprehensive plan for the region. Encourage closer coordination among transcontinental railroad services within the region. Avoid duplication and overlapping of facilities.

Substitute cheaper forms of transportation for non-profitable railroad branch lines.

Highways.—Reconstruct in accordance with military requirements arterial highways essential for national defense; widen shoulders, strengthen bridges, and provide pavement durability on standards adequate for such purposes where necessary to meet these requirements.

Gradually complete the regional system of Federal highways, and extend and modernize State highways as planned by the Public Roads Administration and State highway departments. Build new roads and recon-

struct obsolete highways to meet modern standards. Estimated costs of improving the Federal-aid highway system to standards justified by present traffic and recommended by the Public Roads Administration are: Arizona, \$21,311,000; California, \$214,000,000; Nevada, \$10,180,000; Utah, \$30,000,000.

Construct forest highway systems throughout the region. Build farm-to-market, mine-to-market, and forest- and range-to-farm roads in agricultural, mineral, forest, and range areas lacking adequate transportation. Construct additional roads providing easier access to national and State parks and national monuments where such areas are relatively inaccessible.

To protect public investment in high-speed highways, enact enabling legislation permitting establishment of transportation corridors or freeways along primary roads. This would eliminate dangerous intersections and prevent encroachments along highway rights-of-way by private commercial interests that tend to create congestion and cause traffic hazards. California has enabling legislation for freeways and has begun establishment of freeway routing.

Create Federal and State land authorities empowered to acquire, hold, sell, and lease lands needed for public highways and to acquire, sell, and transfer excess lands for the purpose of recoupmnt.

Carry arterial highways through large cities and bypass small towns except in sparsely populated areas. Construct belt lines around large cities. Provide adequate safety measures at intersections with through highways in urban areas.

To reduce traffic hazards, eliminate dangerous railroad grade crossings on heavily traveled roads; at highway intersections, construct separate grade crossings where economically justified, or provide channelization and modern intersection design. Construct multiple-lane divided highways on roads carrying 5,000 cars per day, particularly on the arterial highway from Sacramento connecting with the east shore highway at Richmond, the east shore highway between Richmond and San Jose, Calif., and the arterial highway between San Francisco and Los Angeles, Calif., through the Central Valley.

Establish city, county, State, and regional master street and highway plans that will include adequate zoning and set-back lines for proposed developments.

In metropolitan areas, construct systems of parkways and through highways under coordinated State and local plans providing for both individual and mass transportation.

Devise methods for obtaining equitable tax returns for maintenance of arterial cross-State highways from vehicles crossing Arizona, Utah, and Nevada. Maintenance of extensive systems of through highways serving residents of other States imposes undue burdens

on these States, which have large areas and sparse populations. Many trucks with large fuel tanks traverse these States without purchasing gasoline or Diesel oil, thus paying no tax for use of their highways.

Encourage and establish more equitable taxation of motor vehicles. Revise or adjust taxes so that each type of transportation will return revenues in equitable relation to the use it makes of the highway and to the costs it imposes in maintaining highway facilities.

Waterways.—Complete channel improvements and rectifications in the Sacramento River as proposed under the Central Valley project.

Maintain harbors and construct necessary navigation improvements at Bodega Bay, Monterey Bay, and Los Angeles-Long Beach and other harbors, recommended by the United States Corps of Engineers.

Eliminate costly tie-ups of ocean commerce on the Pacific coast by more effective procedure for adjusting differences between ship operators and maritime labor.

Airways.—Construct the additional military and naval airports for national defense recommended by the Army and Navy Departments.

Construct the additional general and commercial airports, emergency landing fields, and improved ground facilities recommended by the Civil Aeronautics Authority and State planning agencies.

Zone lands and limit heights of structures around all airports to reduce hazards of flying and provide for future expansion.

Provide easier access and quicker travel between commercial airports and centers of cities.

Urban Development

The economic and cultural life of the Pacific Southwest is focused in its cities. The cities are centers of the finance, manufacturing, and distribution that provide goods and services for residents of other areas as well as for their own inhabitants. Three-fourths of California's population and more than one-half of that of Utah live in urban areas. The region will prosper only if its urban life remains strong and vigorous.

During the last decade, San Diego and Los Angeles were among the fastest growing large cities in the nation. Many small and medium-sized cities, particularly Phoenix, Ariz.; Logan and Provo, Utah; Lodi, Merced, Vallejo, Riverside, San Bernardino, and El Centro, Calif., also grew rapidly. Continued decentralization of manufacturing and distribution will probably further diffuse the region's urban population. Completion of the Central Valley project and other development programs will likewise foster urban expansion throughout the Pacific Southwest.

Most urban areas in the Pacific Southwest are growing, but internal shifts of population and business are creating serious problems, particularly in and around Los Angeles, San Francisco, and San Diego. Expan-

sion is taking place around, rather than within, the cities. Many medium-sized cities are actually "exploding" into the surrounding unincorporated areas. Not only are newcomers settling on the outskirts, but people living in older residential areas are moving to the suburbs. As a result, blighted areas are left behind, while suburbs are experiencing mushroom growth of shack dwellings and haphazard development. The older districts are running down; the newer areas are running wild.

In varying degrees throughout the region, urban areas are undergoing gradual transition to new forms of organization. The conventional pattern of a central industrial and commercial core surrounded by residential districts is being displaced by new designs, not yet clearly understood, in which residential areas are pushed farther outward and new industrial and commercial centers are created outside the central city. The effects of technological advances, such as the automobile, radio, air-conditioning, and electric refrigeration, in shifting urban populations are just beginning to be felt.

Population shifts, however, offer prospective benefits in improved living and working conditions, if dilapidated districts are rehabilitated and suburban expansion is properly controlled. Desirable urban development would provide—

A variety of places to live, ranging from apartments and compact residential neighborhoods in the heart of the city, to suburban communities in the open countryside with various types of living units—single and multi-family dwellings and apartments—available to persons of all income groups;

Areas for homes, playgrounds, and schools separated from commercial and industrial districts. There should be shopping centers within walking distance of every home, and larger community centers with ample parking space located off main highways;

Plenty of light and air and open green spaces throughout business and residential districts. An extensive system of playgrounds and parks linked by parkways that will facilitate travel about the metropolitan area and into the surrounding countryside;

Adequate facilities for individual and mass transportation with a coordinated system of highways, airports, rail and interurban transit lines.

The problem of the cities is that of analyzing causes, trends, and effects of urban changes and making necessary readjustments with minimum disturbance and loss. Rehabilitation of blighted areas within the city centers and necessary guidance for new development in outlying districts require cooperation of city and county officials, civic organizations, property owners and residents, in—

Studying changes and emerging problems in each

urban area and establishing a coordinated pattern of land use, transit and transportation, recreation development, water supplies, sanitary systems, and other essential facilities throughout the entire urban area;

Establishing effective controls that will regulate land use, open spaces, set-backs, lot sizes, arrangement, spacing, types and construction of buildings, sanitation, highway traffic, parking, and other facilities necessary for protection of property values and the public welfare;

Coordinating the activities of local governmental agencies in preparing and carrying out comprehensive plans and establishing and administering controls in the public interest. Coordination may be accomplished by voluntary cooperation among local agencies, or by the establishment of regional planning commissions as authorized by California law to prepare comprehensive plans (similar to those in preparation by the Los Angeles County Regional Planning Commission). Adequate control of urban development, however, may require that the boundaries of central cities be extended to cover adjacent communities and suburbs, or that separate regional agencies be created to administer particular facilities and services over the entire area.

Course of action: Plans, controls, and governmental coordination should be designed to—

Restore balance throughout the area among business, industrial, commercial, and residential districts by gradual readjustments in land use;

Reduce congestion in business and shopping centers by reorganizing the street and highway pattern to provide easier access to and parking facilities at city centers. Route through traffic on freeways with parallel service roads. Eliminate parking on major thoroughfares and provide additional off-street parking and loading facilities. Establish building set-back lines on streets planned for future widening. Provide adequate parking facilities in or adjacent to new downtown buildings, according to bulk and type of occupancy;

Improve mass transit services by better equipment, skip-stop operations, and coordination of train and bus schedules. Integrate transportation services through coordinated plans covering all forms of transport throughout the urban regions;

Encourage rehabilitation and rebuilding of blighted areas. By zoning and other controls, prevent invasion of detrimental uses into areas where present use and development are in conformity with a master plan;

Provide sufficient lands for civic centers, public buildings, schools, parks, parkways, and play spaces, especially for open spaces and parks in downtown residential areas. Increase open spaces and street planting in commercial sections;

Prevent rise and spread of slums. Guide population growth around cities into desirable suburban patterns

through control of subdivision developments, land-use zoning, and extension of needed public services—improved streets, sidewalks, water supplies and sewers, schools, parks and playgrounds, and other essential facilities. Simplify governmental jurisdictions and equalize costs of essential public facilities and services throughout the urban area.

Public Works

One hundred thousand people in 50,000 vehicles cross the San Francisco-Oakland Bay Bridge every day. Despite this heavy traffic, it will take about 20 years to repay the investment of \$70,000,000. But the real value of the structure transcends its monetary cost. Each year it saves 35,000,000 hours of travel time. Not only has it made life easier for thousands of commuters, but it has expedited the production and distribution of goods and services. After it is paid for, the bridge will continue to serve the public at almost no expense. It exemplifies the principle that the value of public works is measured by their usefulness and benefits to people, rather than by their initial cost.

Public works have played an important part in settlement and development of the Pacific Southwest. They have provided physical facilities necessary for economic and social progress. A growing region cannot stop building. Thousands of new structures are needed for the larger population and to replace those that become obsolete.

Because of the large area and diversity of conditions, many kinds of public works will be needed. Army and naval bases, military fields, and training camps must be expanded for national defense. Irrigation, flood control, and power projects (discussed under sec. I) will create larger opportunities for industry and agriculture. More highways, waterways, harbor improvements, and airports are necessary for continued growth. Projects that will provide pure water supplies and abate pollution from sewage and industrial wastes are required for the protection of public health. Sewage-treatment plants are especially needed in Utah and Arizona. More school buildings are needed for the rapidly growing population in California. To keep pace with increasing demands, the region must construct many more hospitals, schools, libraries, and public buildings.

These projects will be sponsored, financed, and constructed by various public agencies—Federal, State, and local. Works for national defense and the larger projects for conservation and development of resources will generally be constructed by the Federal Government. Highways, bridges, armories, and structures required for State institutions and departments will be sponsored by the several States. It is estimated that investment in such works during the next 10 years will exceed \$500,000,000. Local public bodies will build a wide

variety of improvements. The Public Works Administration has investigated and approved applications for approximately 600 non-Federal projects in the Pacific Southwest, estimated to cost nearly \$300,000,000.

Maximum benefits from the huge expenditures for public works can be achieved only by broad planning, programming, and budgeting well in advance of construction. Planning means a study of conditions and needs throughout the area, determination of the kind of development that will be most beneficial, and the types of projects by which such development can be achieved. Programming means determining the size and cost of needed projects and scheduling them in proper sequence for construction. Budgeting means determination of funds that may be available for future construction, either from revenues or from borrowings, and the earmarking of specific amounts each year for projects listed in the program. The 6-year construction programs and budgets recently completed by Sacramento and San Diego are excellent examples of broad planning for municipal public works.

Course of action:

Build public works required immediately for national defense and projects needed to provide water, power, transportation, and other facilities for national defense industries.

Complete projects under construction within the region.

Where prospective benefits justify expenditures, build projects that will conserve and develop natural resources, create larger opportunities for agriculture, lumbering, mining, and manufacturing, or improve facilities and services.

Construct future public works under plans, programs, and budgets prepared in advance on each governmental level—Federal, State, and local. Continue studies and investigations necessary to determine kinds and feasibility of developments and improvements needed in each locality and in the region as a whole. Correlate public works on the various governmental levels through exchange of information and voluntary cooperation in planning, programming, and budgeting.

Provide for construction of essential related works concurrently with construction of basic projects. For example, in southern California, spreading grounds, storage basins, and other water conservation projects should be constructed along with flood protection works that expedite discharge of water from river and stream channels. Likewise, transmission lines necessary for power distribution should be built during, instead of after, construction of hydroelectric plants.

Expand public construction in times of economic depression, and reduce public expenditures in periods of high employment.

Enact legislation permitting financing of public works by revenue bonds in California.

Public Health and Sanitation

While climate and environment are generally healthful throughout the Pacific Southwest, the large numbers of American Indians and of foreign-born, particularly those of oriental and Mexican origin, have added to public health problems. In 1937, Arizona had the highest death rate in the Nation, while Nevada, California, and Utah ranked fifth, sixth, and forty-second, respectively. Arizona also has the Nation's highest mortality rate from gastro-intestinal disorders.

Course of action:

Enact State legislation to permit the establishment of district health units in sparsely settled areas unable to support county health units.

Extend existing hospital facilities under a long-range program to provide medical, surgical, and obstetrical care for those who cannot afford private medical services.

Bring hospital bed facilities throughout the region up to the minimum standard set forth in the 1938 report of the Technical Committee on Medical Care, Interdepartmental Committee to Coordinate Health and Welfare Activities, Washington, D. C.

Extend hospital and medical care to migrants who are not eligible for observation or treatment in local institutions.

Expand hospital facilities for tubercular patients in Arizona, and establish tuberculosis hospitals in Nevada.

Develop municipal sewer systems and sewage disposal plants where these facilities are non-existent or inadequate. Nearly every urban community in Arizona has unsewered areas endangering underground water supplies, and the general use of open privies makes fly-borne diseases a menace. Areas in and around many California cities, particularly Fresno, Oakland, Bakersfield, Stockton, Sacramento, and San Jose, are served by individual household septic tanks that create serious health hazards. In many Arizona towns, garbage disposal methods are unsanitary and unregulated.

Reenact the Arizona Revenue Bond Act to provide means for financing sanitary and waterworks improvements. Construct sewerage and waterworks facilities for cities in Arizona outlined in the report, A Sanitation Study for the Arizona Resources Board, June 1940.

Provide better sanitary facilities for resorts and summer-home areas in the Pacific Southwest where facilities are now inadequate, particularly along the Russian River in California.

Treat sewage discharged into the main and tributary streams of the Sacramento and San Joaquin Rivers, Calif., to a degree compatible with the downstream use of river waters.

Prohibit the discharge of untreated sewage and untreated industrial wastes into the Los Angeles-Long Beach Harbor and San Diego Harbor and along other water fronts to which the public has access.

Abate San Francisco East Bay air and water pollution in accordance with findings of the East Bay Cities Sewage-Disposal Survey.

Abate pollution of lakes, streams, and harbors from industrial plants through cooperative action based on adequate surveys.

Control wastes from hydraulic mining so as not to impose burdens on water-supply treatment plants or destroy aquatic life.

Provide reasonable protection against pollution on all irrigation projects where water is used for domestic purposes. Prohibit discharge of pollutorial wastes into reservoirs, and prohibit swimming except in the upper end of large reservoirs.

Intensify existing control measures to prevent the breeding of mosquitoes. Urge and assist the organization of mosquito-control measures in the Sacramento and San Joaquin Valleys.

Improve and extend rodent control to prevent recurrence and spread of bubonic plague by rigid control measures for harbor cities.

Reduce pollution of the air by bacteria, smoke, and other odor nuisances in metropolitan areas, particularly those of Los Angeles, San Francisco, and Salt Lake City. Abate air pollution from toxic smelter fumes in the vicinity of mining towns.

Develop and improve water supplies for communities without waterworks. Require adequate water supplies and sewage-disposal facilities for motor courts, tourist camps, recreational areas in public parks and forests, private resorts, and dude ranches. For example, Oak Creek Canyon recreational area in Arizona, visited by thousands of vacationists, has no protected water supplies or sanitary sewage disposal.

Investigate incidence and effects on the human system of the rarer elements, boron, fluorine, and selenium, occurring in ground and surface waters.

In many areas, particularly southern California and the mining districts of Arizona, Nevada, and Utah, water is so contaminated by minerals and salts that it becomes unfit for agricultural, domestic, or industrial uses. Studies should be made to determine economic methods of treating this water, and wherever economically feasible, treatment plants should be installed.

Housing

The Pacific Southwest needs more and better houses for its growing population. More dwellings will be needed at military and naval bases and for workers in national-defense industries. Migratory workers and resident families in rural areas should have houses

instead of shacks to live in. Adequate housing implies more than it defines—it connotes happier families and more enduring homes.

Housing surveys in Los Angeles, San Francisco, Sacramento, Oakland, San Diego, Fresno, Salt Lake City, Phoenix, and Reno show that from 15 to 25 percent of the housing facilities are below minimum standards. Approximately 200,000 urban dwellings in the Pacific Southwest should be replaced or rehabilitated. Minimum provisions for low-cost housing during the next 6 years, exclusive of dwellings for migratory workers, should result in construction of 20,000 family units.

Course of action:

Encourage building and remodeling of private homes and extension of home ownership through low-interest loans and other legitimate aids to home owners.

Provide additional housing needed at military and naval bases and for workers in national-defense industries through private builders or local housing authorities, wherever possible, and with full cooperation of available housing associations and planning agencies.

Encourage construction of low-cost housing for low-income families through both public and private efforts. Where private builders are unable to provide adequate housing for low-income groups, construct low-cost housing projects under local authorities, with cooperation of State and Federal housing agencies.

Enact necessary enabling legislation authorizing establishment of city and county housing authorities in Nevada and Utah, county housing authorities in Arizona, and a State housing authority in California, as recommended by the State planning board.

Locate, design, and construct housing projects in conformity with the official plans established by city, county, and regional planning commissions.

Investigate the special needs of migratory workers in California and Arizona, and provide adequate housing for such workers. Advance Federal loans to farmers that will enable them to provide better housing for their workers. Establish camps on public lands where suitable sites are available.

Modernize city and county building codes to conform with improved standards of design and construction. In many places, obsolete restrictions prevent construction of modern housing and increase costs of home building. Establish and enforce county building codes, similar to the Los Angeles County Code, regulating construction of suburban structures in counties where population is growing around peripheries of cities.

Encourage cities and counties to make comprehensive surveys of housing conditions and needs to provide the basis for actual housing programs and the establishment of local housing authorities. Make the State-wide survey

of rural housing conditions and needs recommended by the California State Planning Board.

Expand research and experiments by State universities, industries, financial institutions, and other public and private agencies to lower building costs, improve construction methods, reduce speculative waste, facilitate sound investment financing of homes, blight-proof community planning, and more efficient upkeep and operation of small dwellings.

Education.

Course of action:

To extend the scope and raise the level of education in the Pacific Southwest—

Expand opportunities and facilities for education to all classes and age groups in order to aid the thousands of newcomers in adjusting themselves to their new environment;

Provide better facilities for families living around the outskirts of cities. Arrangements for exchanges of students across county and district lines may aid in accomplishing this;

Provide necessary facilities so that the children of migratory families may complete their elementary and secondary education;

Continue and expand the educational work of the Civilian Conservation Corps and the National Youth Administration;

Extend library privileges to employees of the Civilian Conservation Corps, migratory workers, and similar transient groups.

To provide more adult education for the steadily increasing number of older persons—

Coordinate programs for university extension education and organize more self-supporting adult educational classes throughout the region;

Establish more forums for the study of public questions, for discussions of important issues, and for pursuit of studies in specialized fields. The 177 public forums in California in 1939 should be more than doubled by 1950.

To reduce inequalities of education and training in urban and rural areas for both children and adults, improve educational facilities, and reduce over-all costs—

Consolidate rural schools into central community schools;

Organize regional vocational schools such as the division of vocational forestry and lumbering in the Lassen Junior College, Susanville, Calif., and the California Polytechnic School for agriculture and industry at San Luis Obispo, Calif;

Provide more libraries and trained librarians in rural communities. This might be accomplished by creating regional libraries under district organizations, or by establishing regional branches of State library systems, supported by the State.

To provide more technically trained workers in agriculture and industry—

Increase effectiveness of vocational guidance by coordinating the services of Federal and State labor departments, employment services, and educational institutions on all levels. Distribute widely current information on labor demands in different occupations' and plan vocational and professional curricula in the light of this information;

Expand vocational education to equip workers for occupations in which employment opportunities are increasing in the region. This would be of particular aid to inexperienced youth, to adults without special skills, and to newcomers expecting to find work;

Inform students on all levels of the importance of conservation of basic natural resources and of means whereby these resources can be conserved.

To educate Indians for employment in agriculture and industry—

Continue and expand subsidies to local schools for Indian education and insist upon better adaptation of school programs to the needs of the Indians.

To increase efficiency of public services—

Provide more funds for the in-service training of public employees, and for institutions of higher learning to enable them to train more students for public service.

To improve education on the college and university level—

Raise university entrance requirements throughout the Pacific Southwest;

Emphasize vocational education in junior and State colleges;

Develop technological research in universities;

Encourage student and faculty self-government to foster a more responsible citizenry;

Emphasize individual and group recreation in athletic programs, rather than intercollegiate athletic competition;

Include study of regional resources and needs in educational curricula to create a better understanding of local and national problems;

Provide more scholarships to State universities, sufficient to cover minimum living expenses, so that qualified young people, remote from proper educational opportunities, can obtain a higher education.

**PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
HAWAII: REGION 8, BERKELEY, CALIF., 1940**

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Report of the Hawaii Territorial Planning Board

FOREWORD

The following report is a brief summary of some of the principal facts about the resources, economic activities, and possibilities for development of the Hawaiian Islands. The information and data were taken from the First Progress Report of Hawaii Territorial Planning Board, entitled "An Historical Inventory of the Physical, Social, and Economic and Industrial Resources of the Territory of Hawaii," published February 8, 1939. The recommendations for action have been prepared and submitted by the Director and staff of the Hawaii Territorial Planning Board after consultation with members of the board and representatives of Federal, Territorial, and local agencies and private organizations interested in development of the islands.

The purpose of the report is to outline some of the initial steps in a broad program for the conservation and development of the physical and human resources of the Territory.

INITIAL STEPS IN A PROGRAM FOR THE DEVELOPMENT OF THE TERRITORY OF HAWAII

The Hawaiian Islands are the tips of a 2,000-mile range of volcanic mountains rising from the bed of the Pacific Ocean, about 2,000 miles southwest of San Francisco. The Territory consists of 8 major islands, organized into 4 isolated county units. The islands lying west of longitude 161° W. are known as the Leeward Islands and comprise about 15 small uninhabited islands consisting of volcanic rocks or coral reef rocks and sand.

The area and 1940 populations of the 4 principal county units are as follows:

County	Area in square miles	1940 population
Hawaii.....	4,015	73,275
Maui.....	1,172	55,534
Kauai.....	620	35,818
Honolulu (including Oahu).....	600	258,256
Total.....	6,407	423,329

In 1930, about 18.6 percent of the total population of the Territory was foreign-born, fairly well distributed among the 4 counties. The largest increases in Hawaii's population came through the rise in births following the immigration in the 1880's and 1890's. The Japanese population increased rapidly during 1896-98. The pure Hawaiian population remains about stationary at 20,000 persons; but the number of Hawaiian people partly Caucasian and partly Asiatic is increasing. Since 1917, "other Caucasians" have been in the ascendancy, their number nearly tripling in the last 20 years.

Future growth of population in Hawaii will probably arise largely from the excess of births over deaths. The Territory's population should continue to increase at a higher rate than that of the mainland of the United States, because of its—

- (1) Relatively younger population;
- (2) Proportionately greater number of mature women in the future than in the past;
- (3) Higher birth rate and lower death rate; and
- (4) Gain from mainland immigration.

The per capita wealth in Hawaii ranks with the two lowest of the States, being one-half of the average value in the United States. The per capita income in Hawaii ranks with the four lowest of the States, being one-half of the average value in the United States.

Hawaii's physical resources are limited. There exist no mineral deposits in the form of ores; no coal, oil, or

natural gas; no deposits of phosphate rock containing the plant-foot element phosphorus, so abundant on many South Sea islands. There is no large source of energy held in restraint in the form of snow, ice, or water, as such, on mountains, in lakes and streams at elevations, or constantly on the move to the sea; and there are no extensive forests of pine, spruce, hemlock, and hardwoods. Hawaii is relatively poor in natural resources, but it has three important assets—land, rain, and sunshine.

The outstanding features of the climate of the Hawaiian Islands are the remarkable differences in rainfall over adjacent areas; the tenaciousness of the trade winds through practically all seasons and over all islands of the group; and the persistently equable temperature, which passes through the cycle of the seasons devoid of marked or sudden changes and with only a very moderate difference between the averages of winter and summer months.

The four largest islands and their principal characteristics are as follows:

Hawaii

Largest island of the group, Hawaii is a small "continent" of snow-capped mountains (tallest in the islands), live volcanoes, palm-lined beaches, fern forests, and an impressive section of the United States national park chain. It offers a great diversity of travel experiences, and its off-the-beaten-track sections are steeped in Hawaiian tradition and history. They are the last strongholds, in fact, of the so-called Old Hawaii.

Sugar is king on Hawaii; the other important industrial activities of the island being cattle raising and coffee growing. Hawaii is connected with Honolulu and with the main islands of the group by steamship and airplane service, radio-telephone, wireless, and regular United States airmail routes. It is about 200 miles from Honolulu; an overnight trip by steamer or 1 hour and 45 minutes by passenger plane.

Maui

Famous for its Hawaiian hospitality is the great valley island—Maui. Its location between Honolulu and the largest island (Hawaii) facilitates its inclusion on every tourist itinerary, and its massive dormant volcano, Haleakala, is one of the major attractions of the entire island group. The population of Maui is small in comparison to its size, and this fact accents the

unspoiled atmosphere that pervades the island. It is rural and, at the same time, sophisticated.

Maui is also important from an industrial standpoint, its commercial activities including stock raising, in addition to the major industries, sugar and pineapples. Maui is connected with Honolulu and with the main islands of the group by steamer and airplane services, radiotelephone, wireless, and regular United States air-mail routes. It is about 70 miles from Honolulu; a 5-hour trip by steamer, or an hour by passenger plane.

Oahu

The Hawaiian translation for the island name, Oahu, is "gathering place." From the traveler's viewpoint, that is an apt description. It is the gathering place, the starting point for all Hawaiian tours and vacations—whether they are confined to Honolulu and the island of Oahu, or whether they include trips to the other islands.

It is the transportation and commercial center for the Hawaiian group—for the entire Pacific area, in fact. Honolulu (on Oahu Island), the principal port, largest city of the islands, and capital of the Territorial government, has long been known as the crossroads of the Pacific.

Oahu embraces many of the scenic and vacation attractions—such as Waikiki Beach and Nuuanu Pali—for which the Hawaiian Islands are world-famous. Honolulu is connected by passenger steamship lines with North American, oriental, and Australasian ports; and is the center for the regular steamer and airplane services to the outlying islands of the group.

Kauai

Because of its lush, flaming foliage, Kauai is known as the garden isle of the group. Geologically, it is the oldest island, and it was here that Captain Cook first landed when he discovered the Sandwich Isles in 1778. The only main island not actually conquered in person by Kamehameha, it was voluntarily ceded to his kingdom in 1810. This gem in the "loveliest fleet of islands" is rich in Hawaiian folklore. Romantic legends are related to account for many of the interesting physical characteristics of Kauai, such as the Sleeping Giant, the Hole-in-the-Mountain, and the Menehune Ditch built by Hawaiian "good fairies" (menehunes).

The population is scattered in small settlements near the main ports and in plantation towns in the bountiful agricultural areas, as the Territory's leading industries (sugar and pineapples) are the major Kauai activities. Kauai is connected with Honolulu and with the main islands of the group by steamship and airplane service, radiotelephone, wireless, and regular United States air-mail routes. It is about 100 miles from Hono-

lulu; an overnight trip by steamer, or an hour and a half by passenger plane.

Nature has done much for Hawaii. Her satisfying scenery, equable climate, and temperate bathing waters have given the islands an enviable place in the world's attentions, but progressive citizens of the islands have contributed even more. They have provided modern hotels, apartments, cottages, and all the public utilities. They have developed all the social amenities such as schools, theaters, playgrounds, parks, and facilities for recreation such as innumerable golf courses and tennis courts. Along with this has come the necessary transportation in the form of fine ocean steamers, trans-Pacific airplanes, and interisland steamers and planes of the most modern variety.

Conservation and Development of Land and Water Resources

Land Resources

Hawaii's arable land area, although fairly extensive, on the whole does not comprise many single units in very large tracts possessing soil of high natural fertility; nor are many tracts particularly favored as to topography. With the exception of relatively limited coastal plains, lands put to agricultural use are the gentle mountain slopes cut by many deep ravines or gulches.

The lands that make up the intensively farmed portions of the islands are bounded on all sides by areas of varying sizes and shapes—marginal, submarginal, and waste. In this category are gulch or pali slopes; sections in districts of excessive rainfall; of very light rainfall, or semidesert conditions; of very rugged terrains; of coral and lava; of inaccessible mountainous regions and outcroppings at sea level or elevations, of swamplands and tidal marsh areas. Most of the lands in these classes are at present in pasture, others have been left to lie idle and are covered with vegetation of many kinds but chiefly brush and trees.

For ultimate proper utilization of the areas now idle and of those pasture areas that may possibly be more profitably put to other uses, a careful survey must first be made.

Needs.—Protect watersheds by maintaining forest and grass cover.

Prevent erosion by recognized soil-conservation practices, including the enactment of a soil-conservation district law.

Construct irrigation projects with correlated plans for agricultural and community development.

Control erosion by eradicating wild goats, pigs, etc.

Classify rural lands according to the long-time uses for which they are best suited, and tax them in accordance therewith. Study possibilities for establishing a graduated land tax.

Retain in public ownership all lands so presently held that cannot produce economic returns for private owners and that may be required for the development of public facilities and institutions, and plan a long-range program for their most effective use.

Expand research and experimentation to develop new crops and new uses for agricultural products in industry.

Endeavor to develop markets for surplus crops.

Water Resources

The surface-water resources of the Territory of Hawaii are dependent on rainfall and evaporation, the porosity of the ground, the shape and slopes of the drainage areas of the streams, and the amount and character of vegetative cover. The characteristic drainage areas of the Territory are short, extending from the crests of the mountains to the sea in narrow closely spaced strips, and are very steep.

On most plantations, surface water is used when available, and ground water is used when the surface supply is inadequate.

A small quantity of ground water is used for generating power. Large quantities of water used in the islands are derived from springs, but the discharge of springs is not usually segregated from surface run-off by the plantations. Large supplies of ground water await development on Oahu, Kauai, Maui, Molokai, and Hawaii.

Several tunnels, Maui-type wells, and drilled wells are being driven to develop additional ground water on Oahu, Maui, and Molokai. A large project is proposed for the irrigation of 15,000 acres on Molokai. This would require the excavation of about 10 miles of tunnels to develop ground water in the dike complex of east Molokai and to utilize, on a large scale, the principle of storing water underground by means of bulkheads at certain dikes.

Needs.—Save more rainfall by diverting more surface stream water, whenever and wherever available, to conserve ground water for periods of drought.

Conserve and develop by exportation to drier sections spring waters that are wasted in favored humid regions. Concentrated flows of approximately 50,000,000 gallons daily have always been wasting at Pearl Harbor Springs on Oahu, at East Coast Molokai, at Waiakea Pond on Hawaii, and elsewhere. True conservation of land and water will involve the exportation of these and other valuable water supplies to nearby fertile lands of little rainfall and without ground-water supplies.

Investigate possibilities for using ground water in undeveloped areas with a view to providing water for tillable lands throughout the Territory.

Revise and clarify Territorial water laws, particularly those relating to ground water, and establish equitable

regulations governing water rights and use of water. Study possibilities for establishing a separation tax.

Development of Additional Public Recreation Areas

There is no regular Territorial park system corresponding to those of many of the States on the mainland, although there are recreational areas controlled by the Territory. Most of the public parks are operated and maintained by the several counties. However, many recreational facilities are provided by various branches, commissions, and institutions of the Territorial government.

Great improvements to recreation facilities and program content have been made throughout the Territory since the first municipal playground was established in Honolulu in 1911. The last decade is noteworthy in Hawaii's recreation history because of the marked popular recognition of the recreation needs, and the enthusiasm and demand for meeting them.

Every major island of the Territory can point to many recreational facilities provided through either private or public organizations or by both. In general, the several county governments have taken the initiative in providing public areas, through the Territorial land commissioner, through outright purchase or through gifts by residents. Plantation managers and estates have added materially to such facilities. However, Hawaii can develop more recreation opportunities for its thousands of visitors, as well as for officers and men of the United States Army and Navy and for its own residents.

Needs.—Investigate and determine feasibility of establishing a system of Territorial parks.

Aid with an effective administrative organization in carrying out the Government travel bureau programs.

Provide access for travelers to visit more of Hawaii's varied volcanic features.

Develop highland recreational areas on Oahu, Molokai, and Lanai similar to those of Kauai (Kokee), Maui (Haleakala), and Hawaii (Kilauea), and other areas on all islands, also lowland forest recreational areas.

Preserve and protect Hawaii's beach areas for the use and enjoyment of all. Retain in ownership all public beaches. Provide small-boat public landing beaches in all districts.

Continue the present program of protecting Hawaiian roadsides against defacement by billboards and ramshackle structures.

Improvement of Transportation Facilities

The economy of the Territory depends on ocean transportation. The geographical location of the islands in the Pacific Ocean places the Territory in a

strategic position with relation to trans-Pacific steamship lines. The islands may be likened to the hub of a wheel, the spokes of which represent steamship lines serving the eastern Gulf and western coast of the United States, western Canada, and practically all important ports in the Pacific area. As a result, the Territory is served by the American merchant marine as well as by vessels of other nations.

As long as Hawaii has been inhabited, there has been intercourse and exchange of goods between the islands. The white man first introduced the sailing schooner as a means of travel. As the need for transportation between the islands grew, more steamships were brought over from the mainland.

The most common and popular form of public passenger transportation on the various islands is the motor-bus lines. The populated areas are connected by paved roads, and as the distances are not great, busses have to a large extent displaced railroads as passenger carriers.

Commodities are transported on the various islands largely by numerous short railroad lines. The development of railroad transportation by both plantation and public-utility companies has greatly aided economic progress in the Territory.

One of Hawaii's major sources of revenue is its tourist business, which ranks third, with agriculture first, and Army-Navy expenditures second. Through active promotion by the Hawaii Tourist Bureau for more than 35 years, the tourist business has grown to produce a \$10,000,000-a-year gross income. This income is especially valuable, because it is new money brought in and left in the Territory. It trickles down through all island businesses and professions so that even those not directly in contact with tourists are nevertheless benefited indirectly.

Until more transportation facilities are available, it is not likely that the tourist travel to Hawaii can grow materially; in fact, for the last 3 years, the number of arrivals has been almost constant. Until such transportation is available, every effort should be exerted to develop tourist travel to Hawaii during the lighter spring, and, particularly, fall seasons.

Development of New Industries

The principal industries of the Territory are based on agriculture. This condition has resulted largely from an absence of ores and other minerals; the natural resources consisting mainly of land, water, sunshine, and a 365-day growing season.

Practically all of the sugar plantations are nearly self-contained units with their own transportation systems, shops, utilities, and mills for manufacturing sugar from sugarcane. Hawaiian Sugar Planters Association data indicate that about 70 percent of the employees are engaged in strictly agricultural pursuits,

while the remaining 30 percent are employed in administrative and industrial phases of sugar production. In nearly all cases, the product of the mills is in the form of "raw" sugar, but two plantations, one on Oahu, the other on Maui, produce refined sugar. A byproduct of the sugar mills is molasses, much of which is used locally, but it is also shipped in large quantities to the mainland. Another byproduct of the industry is a fiber board called "canec" which is manufactured from bagasse or the fibrous part of sugarcane.

Only a very small part of the annual pineapple crop is consumed as fresh fruit. The great bulk of it is canned in 9 canneries: 3 on Oahu, 3 on Kauai, and 3 on Maui. The cannery companies do most of their packing in the summer months, at which time most of the fruit ripens. This results in seasonal employment as compared with the more steady employment on the sugar plantations. The crops from Molokai and Lanai are transported by barge to Honolulu for canning, as there are no canneries on those islands.

Although Hawaii, is not an industrial territory, favored with a world-wide commercial background, many large specialized industries have been established in the Territory. Products range from lauhala hats and houseware to foodstuffs, and wood carvings.

The annual yield of the commercial fisheries of Hawaii during the past 10 years has averaged 11,800,000 pounds, with a value as landed of a million to a million and a half dollars, according to the published reports of the Division of Fish and Game of the Board of Agriculture and Forestry.

There is a widespread feeling in Hawaii that the fish resources have declined in abundance during the last quarter century. It is generally believed that depletion from overfishing has occurred primarily among the inshore or shallow-water species, no anxiety being expressed over the condition of the offshore fisheries for pelagic or deep-water species.

Needs.—Investigate possibilities for manufacture for local use and for export of volcanic, oceanic, ceramic, etc., mineral products, including cement.

Study possibilities for manufacture of motor fuel from molasses, thus converting an important agricultural waste product into a usable commodity. Study possibilities for washing brown sugar for local consumption.

Develop new uses for local forestry products. With changed demands, investigate possibilities for rehabilitating rubber growing as an agricultural industry.

Continue exploration of possibilities of building up Hawaiian fishing industries. A Federal fishery station and hatchery are needed.

Develop export markets for local products, especially for shipment to the mainland of tropical fruits and winter vegetables.

Public Health and Sanitation

Hawaii's health problem is unique because of the isolation of the islands and the heterogeneous races and customs. Organization for health protection evolved in the last hundred years is governed by increased knowledge in the field of science and experiments in application by various agencies. The trend in the islands is toward centralization of public-health work.

The future health problem seems to be chiefly one of prevention and covers the fields of engineering, communicable disease, sanitation, and a higher standard of community welfare. The trend is toward specialization of activities with highly trained personnel, responsible to the Territorial government or its agents. Urgent needs are to:

Provide more public aid through necessary legislation for the indigent sick and infirm, including county hospitals and dispensaries.

Provide Federal financial aid for leprosy treatment.

Improvement of Living Conditions

Much has been done in recent years in national building and housing legislation. Local offices of the Federal Housing Administration, the Home Owners' Loan Corporation, and the Hawaii Housing Authority have been established in the Territory.

Slum clearance and low-rent housing have been considered in Hawaii since 1935, when an attempt was made to obtain Federal aid. Surveys are being made for projects to be approved by the United States Housing Authority for demolition of slum, substandard dwellings. The Honolulu City Planning Commission, the board of health, building departments, and the Territorial fire marshal are cooperating to reduce substandard living conditions.

Needs.—Encourage building of private homes and extension of home ownership through low-interest loans and other legitimate aids to home owners.

Provide low-cost housing for low-income families through cooperative public and private efforts.

Enact necessary enabling legislation providing for establishment of local agencies to cooperate with the Federal Government on housing programs in rural as well as urban areas.

Cooperate with the agricultural extension service of the University of Hawaii and the Farm Security Administration and other agencies in promoting rural welfare.

Prevention of Slums by Control of Urban Development

Guide population growth in and around cities into desirable settlement patterns through control of subdivision developments, land-use zoning, and orderly

expansion of needed public services. Improve streets, sidewalks, water supplies and sewers, parks, playgrounds, schools, and other essential facilities.

Prevent inadequate control of land use, lot sizes, spacing, and type of structures that destroy property values and produce blighted areas. This control and regulation of urban and suburban growth is required so that necessary public facilities and services can be supported by tax revenues.

Expansion of Education

The rapidly increasing school population, particularly during the decade from 1924 to 1934, introduced a serious housing problem. While the number of public schools in the Territory has not increased materially since 1900, it has been necessary in many instances to arrange for additional land area. To provide for seven times as great a school population, it has been necessary to provide a large number of new classrooms. In 1925 and again in 1933, the building programs lagged, resulting in acute housing problems in many parts of the Territory. Such periods of lag, of course, necessitate heavy outlays in order to care for existing situations. Extensive building programs were found necessary during the period following 1925 and again during the biennium ending February 1939.

As a result of the expansion in secondary education authorized by the legislature in 1937, high-school building requirements have been abnormal. The great expansion of vocational work during the past 15 years has necessitated the erection and equipment of classrooms designed for the teaching of agriculture, home economics, and the various types of shop work.

In Hawaii the design of buildings is affected in marked degree by climatic conditions. The compact buildings required elsewhere because of the heating problem are out of place. Throughout rural Hawaii, especially, the one-story building with all classrooms opening upon lanais seems to be most suitable. In certain densely populated areas, especially in Honolulu and Hilo, land costs and the necessity for conserving space make it necessary to construct two-story buildings with corridors instead of lanais. The lack of any need of central heating, however, gives opportunity for a type of architecture not generally found on the mainland. Much remains to be done in designing the type of school architecture that is most admirably suited to conditions in the Territory.

Extension of education among all classes and age groups is essential to an efficient democracy. Educational facilities should be improved, and teachers should be trained in curricula of particular application to Hawaii. Increased attention to the agricultural and industrial demands of the islands should be given, and a

definite program of vocational guidance should be initiated.

Needs.—Expand local public problems forums for discussion of important issues and for pursuit of studies in specialized fields.

Provide expansion in training of citizens of Hawaii in understanding of aims and methods of American democracy.

Reduce dual citizenship and work for cooperative modification of foreign language school programs.

Consideration of National Defense

The activities of the Army and Navy for national defense in the Pacific are important factors in the economic and social welfare of the Territory. The Hawaiian Islands comprise the fourteenth naval dis-

trict, the headquarters of which are at Pearl Harbor, Oahu.

Needs.—Cooperate in every possible way with the United States military and naval forces by providing organizations for civilian assistance in national defense.

Develop civilian projects contributory to the maintenance and operation of organized forces for national defense, including adequate housing for Army and Navy officers and enlisted men, at reasonable cost.

Continue to study possibilities for closer economic integration of the Territory with the United States and of ultimately establishing statehood for Hawaii.

Obtain maximum benefits from future expenditures for public improvements by planning, programming, and budgeting public works well in advance of construction.

**PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
PACIFIC NORTHWEST: REGION 9, PORTLAND, OREG., 1940**

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Report of the Pacific Northwest Regional Planning Commission

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FOREWORD

In the social consciousness of every region, there is some general conception of the goals toward which that community should be striving.¹ Within recent years, there has been a rapid development of this community consciousness in all parts of the country, accompanied by a conviction that we should realistically take stock of what resources we have, and carefully think out how these resources can best be used in promoting the welfare and security of the people who are dependent on them.

In response to this movement, which has been particularly strong in the Pacific Northwest, the Pacific Northwest Regional Planning Commission, together with the other eight regional offices of the National Resources Planning Board, has been asked by that Board to submit reports, each delineating the essential framework of the regional development plan that has thus far emerged in each of the great regions of the United States. In this request, it has been suggested that each region attempt to convey in its report an idea of what that region may become within the next one or two decades on the basis of feasible use of the natural and human resources that are known to be available.

In proceeding with this assignment, the Pacific Northwest Regional Planning Commission does not presume to adopt the role of regional master architect. It does attempt to report relevant facts and to draw together and harmonize the various plans that have been developed by the people of the region, and by the technical agencies that serve them.

Such a regional development plan does not need to be drawn out of the imagination. Beginning in 1927, the Congress authorized the Secretary of War to begin a series of studies looking toward the full control and use of the water resources in each of the river systems of the United States. A comprehensive report covering the Columbia River and its tributaries with a plan for multiple use development was submitted by the Army Corps of Engineers in 1932. Further detailed studies covering the Willamette River Basin and other drainages have since been completed. During the same period, the United States Forest Service has been at work on studies of the forest resources of the region and on studies designed to bring about improvement in forest management. The Bureau of Reclamation has been making technical investigations of the possibilities

for the expanding of irrigation and has worked out detailed engineering plans for a number of important projects in various parts of the region.

With the establishment of the Soil Conservation Service, the Farm Security Administration, and the Agricultural Adjustment Administration in the Department of Agriculture, a broad and comprehensive program for the conservation and rehabilitation of farm lands began to take form. All three of these services operate on a decentralized regional or State basis, and each is engaged in working out a program designed to meet local conditions. In addition to these activities, which stem from Nation-wide statutory authorizations, the Department of Agriculture, through its Bureau of Agricultural Economics, Forest Service, and cooperating State extension service, has been sponsoring a localized program of agricultural and land-use planning. Committees, composed primarily of local farmers, are functioning in most of the counties of the region, with the technical assistance of personnel made available by the bureau and its cooperating agencies. As a result of this activity, there is developing in each agricultural area a fairly concrete plan for the development and better use of the land.

The Grazing Service, Fish and Wildlife Service, the National Park Service, the Oregon and California Revested Lands Administration—all of the Interior Department—have been active in planning for the conservation and development of resources placed under their care. The Geological Survey and the Bureau of Mines, with State cooperation, have contributed a large amount of scientific information in the mineral resources field.

The establishment of the Bonneville Power Administration in 1937, and the recent Executive order charging it with responsibility for the marketing of surplus power soon to become available at Grand Coulee Dam, gave the region still another broad field in which public planning must function.

To follow this list of Federal agencies, and the equally important State agencies, to its end would consume more space than can be afforded here. Suffice it to say that the planning activity involved in the execution of this multitude of services that have been undertaken by Federal, State, and local governments does involve a complicated maze of relationships—physical and economic. There is definite need at each level of government for central planning agencies, the chief function of which is to try to see the community as a whole, and to facilitate the harmonizing of plans and the

¹ For some time there has been concrete evidence of this in organizations like the New England Council, the New York Regional Plan Association, and the Southern Regional Committee of the Social Science Research Council.

interchange of information among the many groups concerned.

The Pacific Northwest Regional Planning Commission, with the cooperation of the State planning boards, began to pursue this course in 1934. In 1935, it submitted a report on the future of the region and on the regional organization for planning, construction, and operation of public works.² Currently, the commission has been engaged in a study of migration and other population trends, and of land and industry, as fundamental means for adding to economic opportunity in the region.³ Between these major studies, it has carried out others, for example: Of the region's balance of trade, to throw light on the essential economic position of the region;⁴ of the forest resource on which the region is economically dependent to a high degree.⁵

With a broad background of study, conference, and discussion concerning resource, conservation, and development problems and proposals, it has been possible to prepare, with a degree of confidence, this framework for a regional development plan for the Pacific Northwest.

It should be noted that a framework—and not a plan—is here presented. A complete plan for the region is a concept not yet attainable in the Pacific Northwest. Such a plan would have to be a synthesis of a great many individual plans—of Federal departments, of States and their subdivisions, of civic, corporate, and private interests. Since many of these do not exist and all cannot be secured, much less compiled, in a single

widely understandable plan, the endeavor has been to select only the broad essentials of the larger plans and weave them into a relatively simple statement of objectives for the region, together with general analyses of the outstanding needs and the kinds of public policies, works, and organization that will further the broad and progressive development of the region.

This kind of a skeleton plan is also more in harmony with the nature of subnational regions. While such regions are quite often fairly well defined physical, economic, and cultural entities, they are not units in which a unified political control may be exercised. The more detailed and specific plans are the concern of the States and other responsible political subdivisions. Yet these regions are units for which general directives and plans are extremely desirable, and in which the maximum degree of correlation of development policies and plans will be very profitable.

The regional development plan cannot be in common blueprint form—as might the physical plan for a small area or an individual project. Yet, considering the area and scope of the subnational region, it may be relatively realistic, even though set out in general terms. It must be over-all to be comprehensible. It should be related to a generally ponderable period of time—to the ensuing decade as well as to the coming generations. It should emphasize the larger aims above those of more minor and transitory character. Yet it should be flexible—susceptible of being readily reshaped from time to time to meet new conditions and new knowledge. It should, of course, be subjected to wide review and criticism.

To give a general conception of the regional development plan as a whole, a tabular outline of the framework of a development plan has been presented at the opening of this report.

² Pacific Northwest Regional Planning Commission, National Resources Committee: Regional Planning, pt. I, Pacific Northwest, 1936.

³ Pacific Northwest Regional Planning Commission: Migration and the Development of Economic Opportunity in the Pacific Northwest, 1939 (mimeographed).

⁴ Pacific Northwest Regional Planning Commission: Balance of Trade of the Pacific Northwest, 1937 (mimeographed).

⁵ Pacific Northwest Regional Planning Commission: Pacific Northwest Forest Resources, 1938.

ACKNOWLEDGMENT

This report represents, as stated in its foreword, a brief composite of the development programs and policies formulated by the people of the region and the various agencies that serve them. No one group—least of all the Pacific Northwest Regional Planning Commission (which has reviewed and sponsored the report) or the National Resources Planning Board regional office staff (which has done the mechanical work of drafting it)—would presume to claim this framework of a plan as its own creation. The broad view intended to be presented could result only from a continuing contribution—on the part of the many

Federal and State agencies and public-minded bodies and individuals concerned—to the knowledge of the Region's resources and to clarification of its aims. Grateful acknowledgment is made of that long-term cooperation with the regional planning commission and its associated committees and advisers, as well as of immediate assistance of agencies and individuals in furnishing advice, information as to plans and projects and other data, and illustrations for the report. It is regretted that the great amount and wide range of assistance received precludes specific mention here of those to whom sincere thanks are due.

FRAMEWORK OF A REGIONAL DEVELOPMENT PLAN FOR THE PACIFIC NORTHWEST

TABULAR OUTLINE

1. Land Use Stabilization, Soil Conservation:
 - Retirement, uneconomic farming areas.
 - More economic farm units.
 - Improvement, land-use practices and controls.
 - Water conservation.
 - Soil conservation and refertilization.
 - Mineral fertilizer industry.
2. Land Development—Reclamation—Settlement:
 - Irrigation:
 - Columbia Basin.
 - S Snake Basin.
 - Willamette Valley.
 - Other valleys.
 - Small projects.
 - Land clearing—deforested areas, economic agricultural lands.
 - Drainage and diking.
 - Settlement programs and aids.
 - Range conservation and development, including water conservation.
 - Conservation, nonagricultural lands; forest, watershed, recreation, wildlife habitat, etc.
3. Sustained Yield—Forest Management:
 - Cooperative sustained-yield units.
 - Forest protection, against fire, insects, disease.
 - Improved forest practices, aids, and controls.
 - Forest land rehabilitation.
 - Public acquisition program.
 - Tax adjustment.
 - Technological development, manufacturing, waste elimination, etc.
4. Water Use; Drainage Basin Development:
 - Multiple-purpose projects:
 - Columbia and other drainages, large and small projects.
 - Headwater storage development.
 - Interstate and international agreements for water use and control.
 - Upstream improvements for soil conservation, watershed improvement, range conservation, irrigation, flood control.
 - Flood protection; flood plain zoning.
 - Pollution abatement.
 - Fish and wildlife conservation.
5. Hydroelectric Power Development:
 - Continued power installation in multipurpose projects to meet development and defense needs.
 - Continued development of grid system.
 - Power-use research and experiment program.
 - Regional (corporate) power agency.
 - Coordination of facilities in transmission, interchange and distribution of energy.
 - Rural electrification.
6. Industrial Expansion and Diversification; Manufacturing:
 - Improved management of essential resources.
 - Research and technological development.
 - Aids to capital investment.
 - Establishment of key basic industries—chemical, metallurgical, etc.
 - Establishment of new fabricating, processing, manufacturing industries.
7. Improved Distribution and Marketing:
 - Market research and development—public, industrial, cooperative.
 - Improvement, standardization—processing, grading, packaging, etc.
 - Waste eliminations.
 - Distribution—research and improvement of facilities.
8. Transportation Development; Coordinated Transportation:
 - Trunk waterway system improvement.
 - Rail consolidations.
 - Highway improvement, including limited ways for main routes.
 - Airway and airport system improvement.
 - Integration of transportation lines, terminals, equipment, for effective operation.
9. Social, Economic, and Technological Betterment:
 - Extended educational opportunities.
 - Community improvement and reconstruction.
 - Housing improvement, blighted urban and fringe areas.
 - Sanitary improvement.
 - Improved programs:
 - Employment.
 - Migratory labor.
 - Health.
 - Welfare.
 - Social Security.
10. Cultural Betterment; Outdoor Recreation:
 - Educational system and curriculum improvement.
 - Community facilities and organization for educational discussion, arts, recreational activities, etc.
 - Protection of scenic assets.
 - Development of recreational areas and facilities.
11. Improvement of Governmental Machinery:
 - School district reorganization.
 - Simplifications, consolidations.
 - Tax system simplification and improvement.
 - Improvements in administration and administrative techniques.
 - Coordination of public works and service—Federal—State—local, interdepartmental, etc.
12. Alaska Development:
 - Promotion and acceleration of the utilization of resources and general development.

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

PACIFIC NORTHWEST

I. Basic Resources of the Region: Over-all View of the Possibilities and Problems of Regional Development

Among all the regions of the United States, none is more strongly knit together by physiographic, economic, and cultural ties than the Pacific Northwest. Of all the cohesive factors, no one is more potent than the Columbia River and its tributaries. This drainage system, with closely related areas, embraces, roughly, the States of Washington, Oregon, Idaho and the Rocky Mountain province of western Montana. Within this region¹ there lie approximately 188,000,000 acres of land—approximately one-tenth of the land area of continental United States. Thus far, the region has accommodated less than 3 percent of the Nation's population.

Inventory of the region's natural resources shows clearly that there are definite possibilities of further development which would provide a means of livelihood for a considerably larger population. In such development, the role of government will be especially important for several reasons: The Federal Government retains ownership of about half of the lands of the region. The development and management of these publicly owned resources have a strategic influence upon the economy of the entire region. The Federal Government alone is capable of planning and financing many of the basic projects that are required to unlock new resources. Many of these large projects involve multiple benefits, some of which have never been supplied on a direct-charge basis.²

In order to give perspective to the program outlined in this report, the following over-all view of basic resources is presented:

¹ No precise boundaries have significance in defining a region. For statistical purposes, however, certain arbitrary limits must be adopted. The area included in the so-called Rocky Mountain province of western Montana includes the following 19 counties: Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow. Quite often it is impossible to obtain certain data on a county basis. In such cases, it has been necessary to include the entire State of Montana in the region under discussion.

² Navigation improvements, for example.

Agriculture

Of the 188,000,000 acres in the region, slightly less than one-third (51,000,000 acres) is in farms. Of this farm land, less than one-third (16,000,000 acres) is cultivated. Crop failure and the summer fallowing system practiced in much of the dry-farming area cut down the acreage normally harvested to about 10,000,000 acres. In the final accounting, the region's producing cropland is limited to about 5 percent of the total land area.

Within recent years, this cropland base has not kept pace with the increase of population. The ratio of improved land in farms to population has been on the decrease since 1880. In the 15 years, 1920-35, there had been no net increase in the improved land acreage, but there had been a fairly rapid population growth. The notable lag in the bringing in of new croplands has in part been offset by more intensive farming methods and a decrease in the proportion of the population directly dependent on agriculture. The more intensive use, however, has brought with it impairment of the productivity of the soil. Recent rough surveys made by the Soil Conservation Service indicate that about 3,000,000 acres now under cultivation in the Pacific Northwest are unsuited for sustained cropping, and should ultimately be shifted to pasture and forest. Until new lands become available, however, the present heavy pressure of new farm population seeking settlement opportunities will not permit very much cropland retirement. The critical query, "Why bring in more agricultural land when there is a national problem of an agricultural surplus?" is readily answerable by considering the facts that have been cited. If farming is to retain its appropriate position in the economy of the region and keep pace with the anticipated expansion of industry, a rather extensive program for the development of new croplands is fully justified. New lands are also needed to offset large acreages that are going out of production elsewhere in the Nation.

Careful inventory of the lands potentially available for agricultural use is now in progress. This work is being carried on through a joint project of the Bureau of Agricultural Economics and the National Resources Planning Board in collaboration with other Federal and State agencies. Because of the lack of detailed engineering studies which are necessary to determine the feasibility of many proposed projects, this inventory will not be conclusive in a great many cases, but it will provide a usable compendium of all existing information and a reasonably reliable measure of the "ceiling" for agricultural land development in the region.

Preliminary estimates made by the Soil Conservation Service, based on its surveys and upon census data, indicate that there are, in Washington, Oregon, and Idaho, 5,000,000 acres or more of land not now in cultivation that would be suitable for cropping if used under good soil-conserving practices. Much of this land is already in farms, but, for one reason or another, it is not being used in ways that are commensurate with its real productive capacity. Of the 5,000,000 acres tentatively estimated to be available, 1,000,000 are now in pasture, another million are covered with stumps, brush, and timber, a quarter of a million or more are in need of drainage or flood protection, two and three-quarters million are suitable for irrigation. Further investigations may bring an upward revision of these tentative estimates, but they will probably not greatly change the general aspect of the picture. The best that can be done will probably not push the productive cropland in the Pacific Northwest above 7 or 8 percent of the total land area. The cropland harvested in the United States as a whole in 1934 was 19 percent of its total land area.

The problem of agricultural adjustment in the Pacific Northwest is likely to become even more critical than it has been in the past few years. Because of the relatively small population in the region, it has been necessary to concentrate on specialized products that could bear the high transportation cost involved in moving these commodities to distant markets. In the production figures, this situation is clearly evident: Between 1933 and 1937 the four States produced, on the average, 17 percent of the wheat grown in the United States, 20 percent of the apples, 31 percent of the pears, 26 percent of the cherries, 75 percent of the hops, 15 percent of the sugar beets, 11 percent of the potatoes, 14 percent of the dry edible beans, 12 percent of the strawberries, 12 percent of the onions, 17 percent of the peas produced for canning purposes, 20 percent of the wool shorn. It possessed, during the same period, 6 percent of the Nation's cattle and 18 percent of the sheep.

A considerable proportion of the wheat and fruits were marketed abroad, and with the loss of the foreign

market, it has been extremely difficult to find domestic customers able to take the products at a price that would cover costs of production and transportation. If these marketing difficulties continue, and there is reason to expect that they will, it will be necessary to shift the pattern of Pacific Northwest agriculture farther away from specialized horticulture and toward an expansion of general farming. This implies a need for more acres to supplant the highly intensified cultivation of orchards and truck crops. If this shift is not to bring about the permanent displacement of part of the farming population now dependent upon small, intensively cultivated acreages that have been devoted to orchards and truck crops, there is another implied need for additional farm lands.

Forest Resources and Forest-Products Industry

The paramount importance of the forest resource and the forest-products industry in the Pacific Northwest economy is attested by almost every measure that can be applied. The forested lands of the four States comprise 99,000,000 acres, or 40 percent of the total area. On these lands there stand nearly 900,000,000,000 board feet of timber—over one-half of the total remaining stand in the United States. Over half of the Pacific Northwest timber volume consists of the species suitable for commercial utilization. Within the past decade or two, the region has been supplying almost half of the softwood lumber produced in the Nation.

The forest-products industries directly employ at least 10 percent of all persons gainfully employed in the region. In 1937 these industries accounted for 68 percent of the total wage earners employed in manufacturing industries. The new wealth created by forest-products manufacture, or as the Bureau of the Census defines it, the "value added by manufacture," in 1937 amounted to approximately \$300,000,000. Gross farm income in the four States in the same year, as estimated by the Bureau of Agricultural Economics, amounted to \$522,000,000.³

Of the total out-of-the-region net shipments of commodities in 1929, forest products comprised 70 percent of the tonnage and 40 percent of the value. It has been estimated that the revenue derived from forest products amounts to about 40 percent of the railroad revenues earned on freight originating within the region.⁴

The facts reviewed will serve to show that stability and permanence of the forest-products industries are a necessity if the economic life of the region is to remain at present levels. The prospects, under current forest-

³ Bureau of Agricultural Economics: Release dated Jan. 5, 1939. This figure includes benefit payments.

⁴ Pacific Northwest Regional Planning Commission: Forest Resources of the Pacific Northwest, National Resources Committee, 1938.

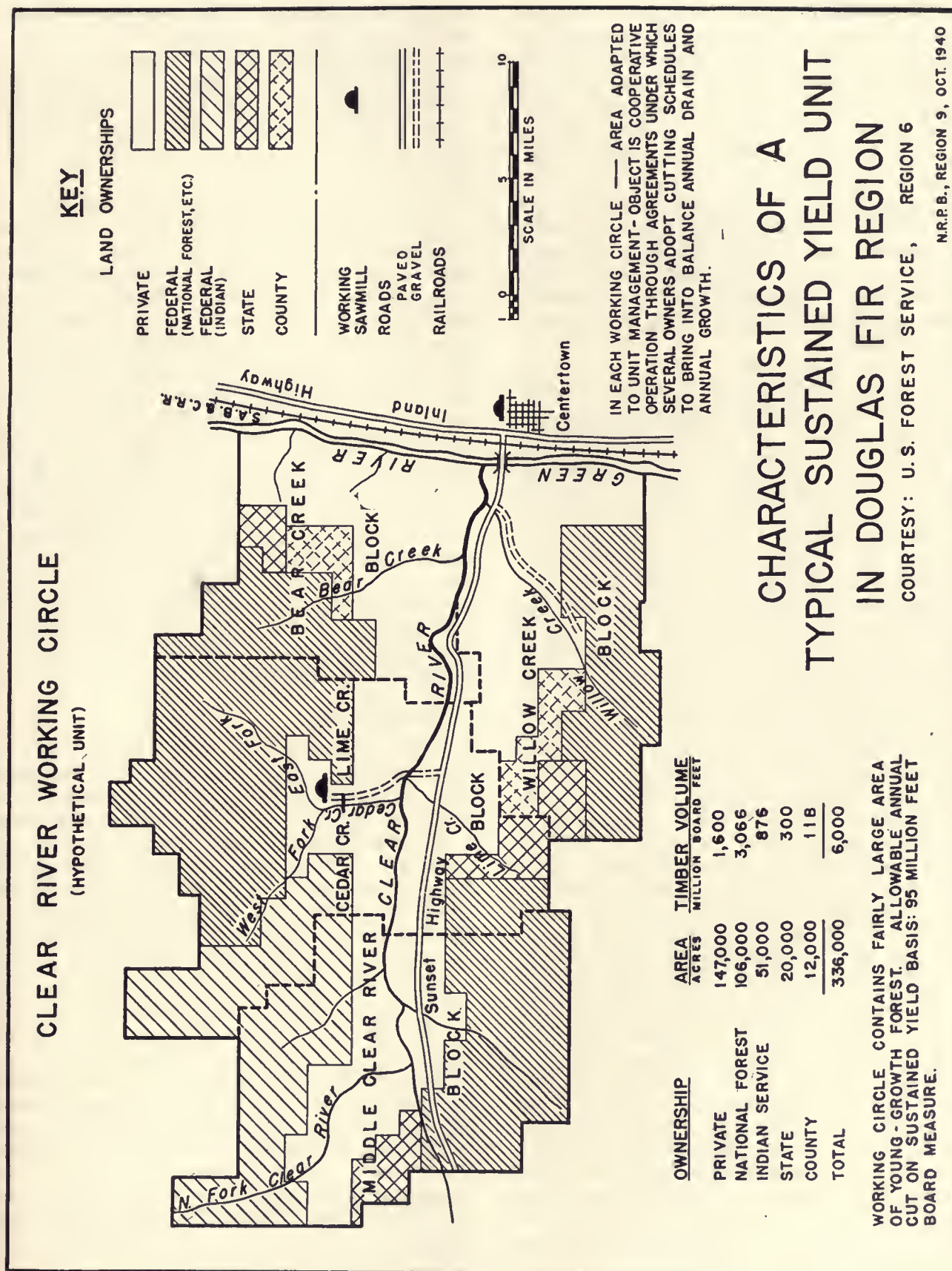


FIGURE 1.—Clear River Working Circle

management policies and practices, are not too bright. The need for a comprehensive and vigorous regional forest program is all too evident when we review the present and prospective discrepancies between the drain upon the resources and its growth replacement.

The current rate of depletion for the four States is in the neighborhood of 15 billion board feet per year. Of this amount, saw-log production accounts for about 10 to 12 billion board feet; minor forest products account for another 1.1 billion board feet; normal losses⁵ from fire, insects, windthrow, and tree diseases account for 2.3 billion board feet. The prevailing losses, which could in large part be prevented by a more adequate fire, insect, and disease control, amount to 15 percent of the annual depletion.

Estimates of forest growth are subject to contention because of the fact that the large stands of mature timber will not put on more volume until the old stands are removed to make way for young growing stands. It is also true that there are considerable areas of very young growth not yet old enough to show favorably in the growth estimates. Taking these factors into consideration, it is necessary to cite estimates based on various conditions. On the basis of the present situation and granting the validity of the qualifying factors noted above, the current annual growth increment is only about 5 billion board feet—3 in the fir region and 2 in the pine region. In the course of time, even under present conditions of cutting and fire protection and rehabilitation, the annual growth increment may ultimately exceed present drain and finally reach about 16 billion board feet—10.3 in the fir region and 5.7 in the pine region. The difficulty with this picture, however, is that the 5 billion of present growth will not accelerate to the 16 billion anticipated for many decades—of course, not in time to avert a marked decline of the industry one or two decades hence. The urgent need for seeking ways and means to overcome this lag is dramatically illustrated in a recent study made by the Pacific Northwest Forest and Range Experiment Station. It was found that in the ponderosa pine region of Washington and Oregon, the net annual growth by 1965, without change in the past forest practice, would be about 600,000,000 board feet. The quality of such increment, according to the station's findings, would be inferior to the timber now being cut. The study then points out—

Growth can be more quickly increased in volume and also materially increased in value only by improved forestry practice. For example, if cutting practice throughout the region were shifted now to a lighter selection basis, leaving the younger, more thrifty 50 percent of the original stand to increase in volume after

⁵ This does not include the catastrophic losses that have occurred every decade or two.

logging, it is estimated that annual net growth would approximate 830,000,000 board feet in the year 1965.⁶

While this particular remedy for cutting down the lag in forest growth (selective logging) is not likely to be feasible in the fir region, the basic problem of stimulating the growth of trees that will be available for harvesting at the end of the next 20 to 30 years is essentially the same.

The regional picture that has been presented with reference to depletion and replacement of the forest resource is not entirely relevant for the reason that a large supply of virgin timber in the upper Willamette Valley of Oregon, for example, will not directly benefit the stricken communities of Grays Harbor, Wash., where depletion has reached an advanced stage. If this problem of forest industry permanence and stability is satisfactorily solved, it will not be through the balancing of drain and growth on the basis of large subnational regions alone—much less on a solely national basis. The only satisfactory pattern, and the one that the region should set about attaining, is one in which well-located centers of forest-products manufacturing become the hubs of forest-land areas, each of which can be managed on a continuous-yield basis. If such a pattern can be established within a reasonable time, the forest industries of the Pacific Northwest might not only partially avert the decline that looms ahead but, in time, increase their present vital contribution to the region's means of livelihood.

Hydroelectric Power

Concentrated within the four Pacific Northwest States (three-fourths in the Columbia River drainage) there is approximately 28,000,000 horsepower of undeveloped water power—40 percent of the national total.⁷ The capacity of installed water wheels in 1937 amounted to 2,300,000 horsepower or 14 percent of the United States total. Completion of the Bonneville and Grand Coulee projects on the Columbia River will boost the installed capacity of the region to over 5,000,000 horsepower. About 25,000,000 horsepower will still remain undeveloped. A glance at the national map of potential water power shows that no region of the country has such a large water-power resource concentrated within a radius of 500 miles.⁸

The conversion of water power into electrical energy and the transmission of that energy to points of demand have opened up vast possibilities for the use of power in industrial development. There was a time when

⁶ Pacific Northwest Forest and Range Experiment Station: *Forest Growth in the Ponderosa Pine Region of Washington and Oregon*, 1940, pp. 28-29.

⁷ National Resources Committee: *Energy Resources and National Policy*, pp. 300-305, 1939.

⁸ *Ibid.* p. 246.



FIGURE 2.—Pacific Northwest Water Storage Map

electrical energy was used principally for mechanical purposes and for lighting. When so used, the cost of power is an important but not a determining factor in the location of industry. Within the past quarter century, however, a new type of industry has arisen, based on the use of electricity as the principal factor in the manufacturing process. A whole new technology involving the treatment of metallic and chemical substances by electrolytic and electrothermal methods has given birth to a group of lusty new industries that are prepared to go to any part of the country where a large, dependable supply of low-cost electric power may be available.⁹ The concurrent development of hydroelectric power with other economic uses of the water resource—irrigation, navigation, flood control, etc.—opens up the way for scaling down power cost to the point at which it will attract this special type of industry.

Rapid development along this line can doubtless be stimulated by completing the regional power-transmission grid now under way, thus providing interconnection of all the principal generating stations and making dependable power available in all the important load areas where demand is likely to grow. Installation of additional generating capacity in the multipurpose projects should proceed safely in advance of demand. Research and experimentation in power uses can also render valuable aid in advancing the program.

In promoting this type of industrial growth, it is neither desirable nor necessary to strive for the establishment of great industrial centers comparable to those of the eastern United States. The prevailing pattern, in the interest of good living conditions and national security, should rather be based on the idea of a balanced distribution, which would avoid undue concentration of population in crowded urban areas. The establishment of a few of the key metallurgical and chemical industries should gradually open the way for the expansion of satellite industries which would fabricate and otherwise utilize the basic products.

The need for such expansion grows out of three conditions: (1) The general lack of adequate employment opportunities; (2) the influx into the region of large numbers of people who are in need of some permanent base of support; (3) the anticipated shrinkage of employment in forest-products industries one or two decades hence when important supplies of virgin timber are approaching depletion and the new-growth timber is not yet available.

Water Resources

No region of the United States has such marked geographic variations in mean annual precipitation.¹⁰

⁹ See Federal Power Commission: *Power Requirements in Electrochemical, Electrometallurgical, and Allied Industries*, 1938.

¹⁰ California comes nearest to the Northwest in this respect.

A large area of the Cascade Mountains, Olympic Mountains, and of the Coast Range has mean annual precipitation of 80 to 100 inches or more. This is well above the rainfall in even the most humid regions of the East and South. The Willamette Valley, which lies between the Cascades and the Coast Range, receives from 30 to 40 inches, but more than half of this ordinarily falls during January and February. East of the Cascade Range the areas of heavy precipitation are confined almost entirely to the rugged mountain regions. The areas suited for agricultural use, with the exception of certain intermountain valleys, receive from 5 to 15 inches. In the great fertile Snake River Basin of southern Idaho, the mean annual precipitation is less than 15 inches, and more than half of this falls in January, February, and March. A similar general condition prevails in the plateau regions of eastern and central Oregon and in the inland empire of eastern Washington.

These peculiar conditions, not found to the same degree in other parts of the country, make the problems of water use and water conservation a matter of vital importance. In general, it is true for the region east of the Cascade Range that economically available water supplies are the limiting factors in the expansion of agricultural-land use. To bring the most fertile and suitable lands into production, it has been necessary to divert water from whatever streams were available, to construct canal systems, to build storage reservoirs, and to divert water from one drainage basin to another. The fact that one-third of the total acreage harvested in 1934 was under irrigation emphasizes the importance of water to Pacific Northwest agriculture. Even west of the Cascade Range, supplemental, summer irrigation is getting increasing recognition as essential to most effective use of lands.

In many parts of the region, these water life lines are inadequate to serve the areas now under the irrigation ditches. Losses mounting into millions of dollars due to water shortage are periodic occurrences in the Snake River Basin and elsewhere. In these areas there is an urgent need for the development of supplemental water supplies.

While irrigation is the major consideration in water use and control throughout most of the area lying east of the Cascade Range, it is not the only factor that merits attention. The vast potentiality of water power has already been described. In most cases the development of this power can be nicely harmonized with irrigation developments. Flood control, likewise, often can be made to fit into the coordinated water plan. The main stem of the Columbia has a flow that will be ample for all conceivable uses. There is every reason to develop to the full its potentialities as an inland waterway. The same holds true for the Willamette

River, where all of these uses will be harmonized in a multiple-purpose development. Here, in addition, the increase in stream flow during summer and autumn months will aid in the abatement of a critical pollution nuisance pending the carrying out of a comprehensive plan of sewage disposal for the valley.

The pattern of regional water resources planning should provide for a careful integration of all water uses, each in its proper balance. This will require increasing collaboration of Federal and local planning and construction agencies in the technical investigations that precede the initiation of projects. No insuperable difficulties exist at the present time, and none will be likely to arise if provision is continually made for the joint consideration of projects on a regional and on a drainage-basin basis.

Mineral Resources and Mining

The total value of minerals extracted in the four States in 1937 was \$156,000,000¹¹—an amount equivalent to 30 percent of the estimated gross farm income of these States.

Of this regional production, Montana contributed \$82,000,000—of which \$35,000,000 were in copper, \$9,000,000 in silver, \$7,000,000 in petroleum, \$7,000,000 in gold, \$6,000,000 in Natural gas, \$5,000,000 in zinc, and \$4,000,000 in coal.

Idaho production amounted to \$41,000,000—of which \$15,000,000 were in silver, \$12,000,000 in lead, \$7,000,000 in zinc, and \$3,000,000 in gold.

Washington production totaled \$26,000,000. The chief minerals were: \$9,000,000 worth of sand, gravel, and stone; \$6,000,000 of coal; \$1,000,000 of gold; and another \$1,000,000 in clay. With the opening of a new mill in Chelan County (Howe Sound) in 1938, the State in that year produced \$5,500,000 worth of copper, lead, zinc, gold, and silver. If this type of mining continues to expand, Washington may become an important producer of the mixed types of ore so important in Montana and Idaho.

Oregon mineral production in 1937 was valued at slightly less than \$7,000,000. Of this \$1,800,000 were in gold. Sand, gravel, and stone accounted for \$2,500,000.

Among the States of the Union, Montana in 1937 ranked fifteenth in value of minerals produced, Idaho twenty-fourth, Washington thirtieth, and Oregon fortieth. Idaho led all the States in the production of silver and antimony; it ranked fourth in the production of zinc. Montana led all other States in the production of manganese, arsenous oxide, and vermiculite; it ranked third in the production of copper. Washington led in the production of magnesite and ranked third in

the production of diatomite. Oregon ranked second in the production of mercury, chromite, and diatomite; third in the production of platinum and allied metals.

The present hostilities in Europe, Asia, and Africa and the American national defense program bring to the forefront the problem of procurement of essential, strategic, and critical minerals. Deposits of low-grade manganese have been mined for some time in Montana, but production has normally not exceeded 2 or 3 percent of the United States' requirements. Chromite has also been mined, but the total output thus far has been small in comparison with the country's needs. The aircraft and other industries have created a large demand for aluminum, magnesium, and their alloys. Within recent months, a plant has been established at Vancouver, Wash., to utilize Columbia River power in the reduction of aluminum ore shipped in from South America and southeastern United States. If new processes could be developed to the commercially feasible stage, it might be possible to produce aluminum from the alunite clays found in Utah, Washington, and elsewhere. Magnesium might likewise be produced from the magnesites and dolomites of Washington or from brines. Tungsten is an essential in the making of certain alloy steels, but Idaho, Montana, and Washington produce only a small amount in comparison with the Nation's requirement. Mercury is also important from the defense standpoint; domestic production is comparatively small and limited to California and Oregon. The mineral resources of Alaska also have high present and potential importance in the national security.

To what extent the Pacific Northwest and Alaska can contribute in the production of these essential and strategic materials is still a matter of some uncertainty. Better judgments should be possible with the completion of technical investigations now being carried out under authority of the Strategic Minerals Act.¹²

The problem of developing the mining and metallurgical industries of the Pacific Northwest is closely bound up with the need for more extensive geological and mineral exploration work. The mineralized areas of the region possess many known occurrences of important metallics and nonmetallics not yet commercially utilized. When the magnitude and quality of these deposits are more definitely known, it will be possible to give more adequate attention to the problem of developing suitable metallurgical and processing technology. Because of the possibility of utilizing the large supply of low-cost electric power, the processes most economical in this region may deviate radically from past standard American practice.

¹¹ For an up-to-date study of potential defense industry in the Pacific Northwest see Bonneville Power Administration: *Industries Important to National Defense Feasible of Establishment in the Pacific Northwest*, July 1940.

¹² U. S. Bureau of Mines: *Minerals Yearbook 1939*.

Ideally, the mineral investigations of this region should be closely coordinated with a parallel program of research and experimentation in power use. In addition, the planning of the future power system should take into account the requirements of the mining and metallurgical industries.¹³

Manufacturing Industry

The new wealth created in the four States in 1937 by manufacturing industries amounted to \$544,000,000¹⁴—a sum slightly exceeding the estimated gross farm income.

Of this regional total, Washington contributed 54 percent (\$295,000,000), Oregon 31 percent (\$169,000,000), Montana 8 percent (\$42,000,000), and Idaho 7 percent (\$38,000,000). The distribution of wage earners employed coincides almost exactly with these proportions. The two coast States (largely those portions lying west of the Cascade Range) have about 80 percent of the region's manufacturing. This is offset in part, of course, by the concentration of the greater part of the mining activities in Montana and Idaho.

No available data are entirely satisfactory as an accurate indicator of the region's present stage of industrial growth. However, on the basis of the new wealth per capita of population annually produced by manufacturing activity, the region shows, in comparison with the national average, a deficiency of 25 percent in 1937. Manufacturing industry in the Nation at large produced new wealth, equivalent to \$195 per capita; the corresponding figure for the four Pacific Northwest States was \$146. In a few special lines—forest products, food products, pulp and paper—the regional per capita production exceeded the national by a very substantial margin. In all other lines, the regional per capita output was but a small fraction of the national figure. (See table I.)

If, through continued depletion of the timber supply, the wood-using industries should fade away and no additional economic underpinning should have been developed in the Pacific Northwest industrial structure, the results would be extremely serious. Removal of these industries from the 1937 pattern would have left the region at a level 65 percent below that of the Nation.

Industrial development stimulated by catch-as-catch-can promotion, tax concessions, and other forms of community subsidy is legitimately suspected by a

¹³ The vital relationship between power supply and mineral production is illustrated by the situation in Montana during 1937 thus described by the U. S. Bureau of Mines: "Mining of zinc-lead ore at Butte was far below capacity because of the continued shortage of electric power which prevented capacity operations of the electrolytic zinc reduction plants."—*Minerals Yearbook 1938*, p. 329.

¹⁴ This is the total "value added by manufacture" as reported by the Census Bureau.

great many people. This, however, should not blind the Pacific Northwest to the urgent need for an orderly and economic development of every feasible new type of manufacturing that will strengthen the industrial base of the Region's economy.¹⁵

TABLE I.—Value added by manufacture per capita of the population in the 4 Pacific Northwest States and United States

1937			
Industry groups	Region	United States	Ratio of region to United States (percent)
All industries ¹	\$146.44	\$194.75	75.2
Food and kindred products.....	26.89	25.95	103.6
Textiles and their products.....	1.41	22.99	6.1
Forest products.....	63.12	9.79	644.7
Paper and allied products.....	15.55	6.60	235.6
Printing, publishing ²	8.39	13.87	60.5
Chemicals and allied products.....	1.21	13.88	8.7
Products of petroleum and coal.....	.86	4.55	18.9
Leather and its manufactures.....	.21	4.58	4.6
Stone, clay, and glass products.....	1.84	6.75	27.3
Iron, steel, and their products ³	2.81	26.56	10.6
Nonferrous metals and products.....	.87	6.63	13.1
Machinery ⁴	4.08	26.82	15.2
Transportation equipment.....	1.18	14.59	8.1

¹ Includes rubber products and miscellaneous industries.

² And allied industries.

³ Not including machinery.

⁴ Not including transportation equipment.

Source: U. S. Census of Manufactures and Census Bureau Estimates of 1937 (Population).

II. Objectives of the Regional Development Program

The central objective of the action programs, briefly touched upon in the foreword, may be stated in a single phrase: The full use of human and physical resources to augment the welfare and security of the people now and in the generations to come.

While the developmental activities are dispersed over a wide front and are entrusted to a great many agencies, it is possible to draw the whole program into focus and present it in a fairly simple statement. This may serve as general guide and criterion for the consideration of specific program proposals—public, civic, and private—and supply a view of the general framework into which the various subsidiary programs should fit.

It should be emphasized that the 12-point program here outlined is not an artificial creation of the Regional Planning Commission or a planning staff. It is a synthesis, in simplified form, of the aspirations of the region itself. It represents a concentration of official, technical, and citizen views gathered through a democratic process engendered by a continuous merging of departmental, State, and local plans. This has been fostered through a long series of large and small conferences attended by both laymen and technicians, by the meetings of regional and State planning agencies

¹⁵ Migration and the Development of Economic Opportunity in the Pacific Northwest, pt. II, secs. 2 and 6; also The Balance of Trade of the Pacific Northwest, Pacific Northwest Regional Planning Commission.

and their technical committees, and by the general pooling of insight and experience.

Each of the 12 major points in the regional program is compressed into a single statement. Brief amplifications are given in the subsidiary notes. Although stated in broad terms, these objectives are intended to emphasize the more realistic and immediate aspects of development that may be hoped for in the readily ponderable period of 10 years.

The Major Objectives

1. To stabilize agricultural land use and to preserve irreplaceable soil, the Pacific Northwest should carry forward a broad program for the improvement of land management.

(a) Retire from cultivation those areas in which soil depletion cannot be arrested by economically feasible changes in cultivation method and cropping system.

(b) Increase the size, in a number of areas, of farm operating units now too small to permit conservative use of the land.

(c) Make full use of soil-conservation districts, grazing districts, rural land zoning, and other public and cooperative devices for improving land-use practice.

(d) Continue and expand soil conservation programs in order to maintain the productive power of good croplands now in use.

(e) Foster the establishment of a mineral fertilizer industry (phosphate, potash, etc.) adequate at least to supply these elements in quantities and at a price that will meet the need for maintaining the productivity of the western croplands.

2. To provide, within the decade, economically adequate settlement opportunities for at least 20,000 or 25,000 farm families and to permit agricultural production in the region to keep pace with other forms of development, the Pacific Northwest should reclaim by irrigation, clearing, drainage, diking, and flood control at least 1,000,000 acres of fertile croplands.

(a) The larger units in this program should be the Columbia Basin area of Washington, the Snake River Basin area of Idaho, the Willamette Valley of Oregon, some of the cut-over area of western Washington, and the intermountain valleys of central and western Montana and northern Idaho. Smaller projects for irrigation, clearing, and drainage of suitable land should be distributed throughout many parts of the region. Range improvement work should be applied in the grazing areas.

(b) To accomplish this, there would be required a continuing systematic land inventory based on reliable soil and land classification surveys covering

the most favorable areas. Public aids should be devised to promote and control land clearing and especially to insure that farm units so created shall be large enough to support a family at an acceptable standard of living. For the larger irrigation projects, there should be in operation a settlement program that will assure the development of well-balanced modern communities designed to give the maximum economic and cultural opportunities at lowest feasible cost.

(c) Definite provision should be made, through suitable long-term financing, to accommodate a substantial number of the farm families who have been forced off their lands elsewhere and who are now financially unable to acquire new foothold in the Pacific Northwest.

(d) In certain areas, like the Willamette Valley, where soil and climatic conditions are highly favorable, some additional settlement opportunities should be provided through a more intensive use of lands.

(e) In conjunction with this cropland development, there would be required a well-rounded program for the conservation of nonagricultural lands and full development of their multiple uses—forestry, watershed protection, recreation, and wildlife habitat.

3. To assure a permanent supply of timber for the region's wood-using industries and thereby to maintain the many communities economically dependent upon them as well as to continue to supply a substantial part of the Nation's needs, there should be established a system of sustained-yield forest operating units embracing all, or at least a major part, of the commercial forest lands.

(a) Each unit should be established by appropriate agreements, which would bind the cooperating private and public forest land owners to participate in a management arrangement that would finally assure a continuous supply of timber to the dependent mills. Appropriate Federal and State legislation should be provided to induce private forest land owners either to participate in such management arrangements or to dispose of their lands to some authorized agency prepared to adhere to these agreements. Concurrent with the establishment of these sustained-yield operating units there should be substantial increases in Federal and State appropriations and programs for fire protection of privately owned forest land and for the control of destructive insects and tree diseases, and for the rehabilitation of denuded areas. The ad valorem property tax should be modified and adjusted in ways that would encourage im-

proved forest management. Public acquisition, both Federal and State, should be extended to assist in setting up workable management units, to prevent untimely cutting of second-growth forests, and to take off the market timber now held by weak ownerships. Steps should also be taken to keep to a minimum the area of tax-delinquent and abandoned lands. Research and experimentation should be further developed to aid in the solution of technical problems of forest management, including logging, silviculture, manufacturing, waste elimination, and forest economics.

4. To provide water for all uses where and when it is most needed, the region should advance its construction program to provide fullest practicable control and use of stream flow in all the major drainage basins.

(a) The Corps of Engineers, in collaboration with the Department of Agriculture, the Bureau of Reclamation, and a permanent Columbia River power agency, should determine the locations and capacities of storages required for a more effective regulation of the Columbia River and its major tributaries. The necessary international and State agreements should be negotiated with terms agreeable to Canada and the upper basin States.

(b) The major elements of the Columbia, Willamette, and Snake Basin projects should be completed, under way, or fully planned within 10 years. A program of smaller projects, widely distributed throughout the region, should also be well advanced. Supplemental water supplies should have been developed to meet the needs of irrigated areas now inadequately served.

(c) The upstream area of each drainage basin should be carefully surveyed, and plans should be in operation to provide for the practicable maximum of flood control, run-off retardation, and soil stabilization. In the lower sectors of each drainage, flood protection works and flood plain zoning should be developed wherever necessary.

(d) Pollution abatement measure should be in operation on the streams where waste and sewage disposal create a menace. Every practicable effort should be taken to build up and conserve fish and wildlife resources.

(e) Techniques for drainage basin project planning, including the objective measurement of costs and benefits of multiple-purpose projects and the determination of priority ratings, should be perfected.

5. To derive the fullest possible benefits from its hydroelectric power resources, the region should have in operation a comprehensive and fully integrated high-capacity power system providing adequate inter-

connection of all principal generating plants and load centers.

(a) The physical means by which to accomplish this end lie in a well-balanced program of construction of multiple-purpose projects in which generator installations are kept safely ahead of the growing power demand, and in completing the essential framework of the Federal regional grid system of transmission lines. The grid system should be administered by a Federal corporate agency charged with full financial responsibility for making the enterprise stand on its own feet. The agency should have sufficient access, either directly or through the Federal Treasury, to the capital market to enable it to carry forward its construction and power market development program on the most orderly and economical basis. With regard to taxation, personnel selection, accounting procedure, and general financial responsibility, it should have a status similar to that of a private corporation organized to render this kind of economic service.

(b) The power agency, in collaboration with the appropriate technical services of the Federal Government and the States, should be operating a power utilization research laboratory equipped with the necessary engineering development (pilot plant) facilities. Research and demonstration should be recognized as one of the vital functions of its administrative responsibility.

(c) Rural electrification should be further extended into all areas where such service is at all feasible. Rates and rate policies should be designed to encourage the maximum use of electrical energy on farms.

(d) Insofar as technical improvements in power transmission shall have made them feasible, suitable arrangements for advantageous interregional interchanges of energy should also be worked out.

6. To attain greater economic security and more stable employment, the Pacific Northwest should expand and diversify its commodity-producing industry—especially that based on the manufacture of its raw-material resources.

(a) This implies less direct economic dependency upon those activities that involve the extraction and liquidation of raw natural resources and more dependency upon the creation of wealth through application of labor, skill, and technological processes. The steps by which the region may attain this desired end are (1) discovery and development of new technology related specifically to low-cost hydroelectric power, to use of low-grade and waste materials from forest and farm, to the mineral re-

sources existing in the region or capable of being economically imported; and (2) the stimulation of the necessary capital investment in plant and equipment through a national program appropriately designed for such purpose.

(b) With the investigations of electrochemical and electrometallurgical processes, there should be an intensified exploration of the mineral deposits having greatest commercial promise. Practicable means for cooperation of public agencies and private interests in carrying on this work should be devised.

(c) With such a program in operation, there should be established within 10 years a number of economically sound basic industries—metallurgical, chemical, and so forth. This should provide the basis for the growth of other new fabricating and processing industries.

7. To extend the markets for Pacific Northwest agricultural and industrial products, to reduce the unit cost of marketing services, and to make marketing facilities available to the majority of producers, there should be established a better organized system of marketing services and practices, trade connections, and distributing outlets.

(a) Some of the ways to accomplish this objective would include further development of cooperatives to serve in certain fields where this form of organization is adaptable; further pooling of trade-promotion funds expended by independent producers; increased market reporting services by public trade information agencies; more rigorous standardization of products through improved grading and inspection; removal of price-depressing influence of low-grade, cull, and waste materials through increased industrial utilization of such materials in chemurgic and byproduct specialties.

8. To improve further the efficiency of the transport services and reduce transportation costs, there should be made effective a greater coordination of water, rail, highway, and air facilities.

(a) This calls for definite progress toward a coordinated system of transportation, in which the most efficient means and modes are developed and maintained—not in haphazard fashion with overlapping facilities and wasteful competition, but in an integrated pattern of complementary facilities in which water, rail, highway, and air transport each performs the services for which it is best adapted. Among means of progressing toward this objective are (1) a correlation of the work of public agencies (planning, regulatory, and administrative), viewing the problem as a whole, determining essential con-

ditions and needs, objective standards for measuring true costs of transportation by various modes, development and administrative plans, and other methods and means of procedure; (2) development and execution of a program to provide for the essential integration of lines, equipment, terminals, and interchange facilities—both public and private—as to design, construction, maintenance, operation, and management.

(b) In the Pacific Northwest, a modern regional trunk waterway system, parts of which are now completed, should be gradually improved and extended, within economically feasible limits, as one element in the multiple-use development of the rivers and in the coordinated transportation system of the region.

(c) Railroad consolidations and extended joint use of trackage should be accomplished wherever conditions warrant.

(d) Numerous highway improvements, including the development of limited ways on some of the main routes, should be carried out.

(e) The intense stimulus now being provided to aviation through the national defense effort will doubtless result in a very rapid expansion of civil air transport. The Pacific Northwest should keep pace with this movement by planning and constructing an airport and airways system adequate to meet the requirements of safe and economical air transportation in this extended area.

9. To aid the maintaining and improving of standards of living and standards of labor efficiency, there should be in effect throughout the region comprehensive, continuing programs for social, economic, and technological betterment, in which the essential public and private efforts are well correlated.

(a) Included should be such measures as: extension of educational opportunities adapted especially to meet the needs of inexperienced youth and of adults who have no special skills; encourage the elimination of substandard housing by private and Government-aided enterprise, together with demolition and reconstruction of urban blighted areas suited to low-cost public housing projects; further development of the Federal-State system of social security to minimize the social and economic costs of unemployment, sickness, and old age; continued employment of able-bodied unemployed on socially constructive projects, governmental policy and programs which would induce stabilization of employment through better planning of production.

(b) Special efforts should be made to raise the annual income and living standards of seasonal and migratory agricultural labor. This would require

cooperation of public agencies and private interests in providing decent and sanitary housing facilities at the sites of the seasonal work. Improved facilities for medical service, especially immunization and child care, should be developed. The public employment agencies should perfect procedures for accurately forecasting the labor requirements of each area that requires migratory labor and for keeping in constant touch with those seeking such work. In this way, much of the needless wandering would be eliminated. In many localities, it should be possible to establish a home base for the worker's family, consisting of a small tract of land and a low-cost house, which the family might own or rent. Insofar as practicable, these people should be aided and encouraged to use these tracts for the production of part of their own food supply. Educational and other community facilities should be made available to this now homeless group through such settlement programs.

10. To stimulate greater appreciation and creative effort in behalf of cultural values and to bring greater cultural, recreational, and related benefits to the people of the region, there should be an expansion of public and private programs to foster those activities and institutions which may serve this end.

(a) The means for realizing these objectives lie very largely in further improvements and extensions of free public education, especially at the adult level, and in the fostering of community organizations for dramatic, literary, musical, and art productions. Opportunities for training in a wide variety of handicrafts should be greatly extended, and efforts should be made to develop original designs that express the qualities inherent in the region and its people. School curricula should be so organized that they can accommodate materials relating to regional problems and accomplishments. Library services should be improved and extended.

(b) Special attention should be given to the further development of outdoor recreation, to the preservation of the region's outstanding scenic assets, to the improvement of State park systems, to the preservation of roadside timber, and to the problems of making scenic and recreational resources accessible to both visitor and resident at costs that are attractive to people of modest means.

11. To reduce cost and to make services more effective and efficient, the machinery of State and local government should be modernized and simplified.

(a) Some of the major accomplishments that should be realized within a decade are: Systematic

reorganization of school districts into patterns that will equalize educational opportunity and equitably spread the burden of school costs; adaptation of units of local Government to the use capabilities of the lands each may embrace; adjustment of the property tax to conform to the long-term productive power of agricultural and forest lands; establishment of systems for the recruitment and selection of non-policy-making State and county employees on a merit basis; limited experimentation with the manager form of county government.

(b) Federal and State Governments should make marked improvements in the machinery and techniques of administration, especially in procedures for planning, budgeting, financing, and coordinating projects and programs for resource conservation, for public aids and controls in economic development, and for public services and public works.

12. To promote and accelerate the utilization of resources and general development in the Territory of Alaska.

III. The Region One or Two Decades Hence—Influence of Current and Future Programs

What should be the appearance of the Pacific Northwest one or two decades from now? To attempt an answer to such a question in detail would hardly be a profitable exercise because too many imponderable factors are involved. Nevertheless, it may be useful in clarifying objectives to present some tentative sketches of the new features that should emerge as the direct result of such a program. The following section attempts more tangibly to visualize some of the more prominent changes that should be sought in the period immediately ahead.

Grand Coulee—Columbia Basin Area

This project, certainly the most far reaching, will ultimately transform a district with a total area of some 2½ million acres, now semidesert, into a highly developed agricultural community, accommodating perhaps a third of a million people. With the assured water supply that the project works will provide, the hazard of crop failure will be practically eliminated. Definite steps are now being taken toward insuring that the lands shall be operated in adequate family-sized units; that the towns, utilities, and transportation services shall be laid out in the most economic patterns; that suitable areas shall be developed for recreational purposes; that a substantial number of farm families now without homes shall be rehabilitated on the project

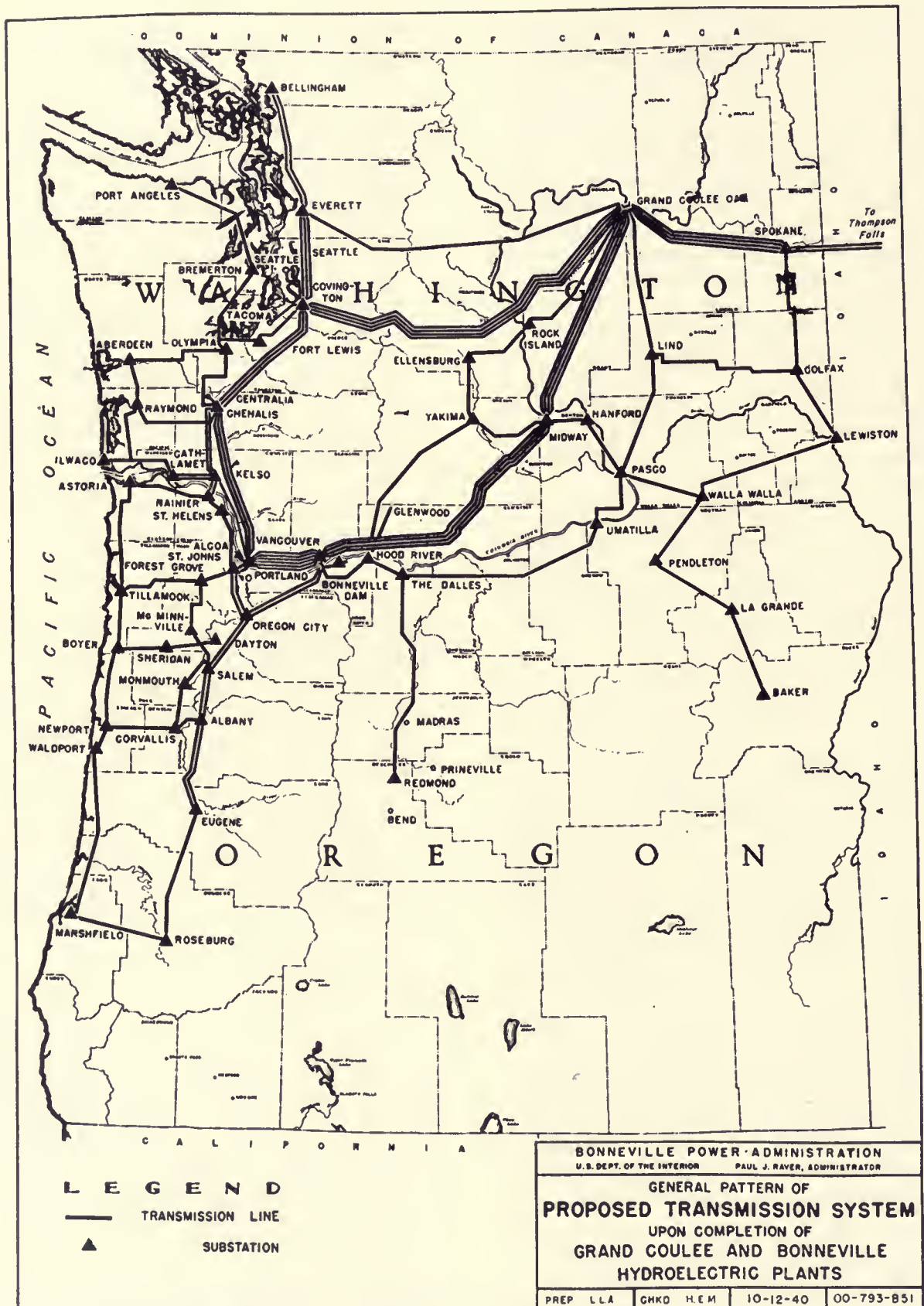


FIGURE 4.—Proposed Transmission System, Grand Coulee and Bonneville Hydroelectric Plants

lands; that the types of farming adopted shall be those that will sustain soil fertility and produce commodities that can be marketed. Improved types of housing and of farm buildings should be much in evidence throughout the area.

The Fertile Crescent of Southern Idaho—Snake River Basin

This broad crescent of fertile lands extends from the Wyoming border through southern Idaho into eastern Oregon and constitutes one of the major assets of the region. Some 2,000,000 acres lying in its eastern and western sectors are already developed. In both areas, however, supplemental water supplies are urgently needed and should be made available. This should give greater stability to the whole economy of the basin and enhance the standard of living. The midsection, still in sagebrush and containing a million or more acres of potentially irrigable lands, should within 10 or 20 years have been placed under irrigation. In this large new area, the opportunity to provide the basis for an improved security on the land is similar to that under the Grand Coulee project. Development of needed new water supplies will require some diversions from one tributary to another and a unified plan of water control. The end result will be an agricultural subregion in which farming, grazing, and industry can develop in a nicely balanced relationship.

The great deposits of phosphate rock, situated in the eastern part of the basin, should become the basis of a mineral fertilizer industry adequate at least to supply the needs of western croplands.

The Willamette Valley of Oregon

This valley is the oldest agricultural area of the region, but for various reasons it has experienced little new development in the last few decades. The coordinated water-control project partially authorized by Congress and involving construction of seven dams on headwater streams will afford needed protection to many communities and to some 270,000 acres that now suffer frequently from damaging floods. It will provide a water supply for summer months' irrigation of 350,000 or more acres. This will greatly enhance the productiveness of lands that normally become too dry before the crops reach maturity. The flood protection features will also make feasible the drainage of large areas whose productivity is now impaired by an excess of water. Improved inland navigation on the Willamette River, now confined almost entirely to the movement of log rafts, will be extended to Albany, some 70 miles above Portland. With these improvements under way, the aspect of the valley should quickly change from one of arrested growth to one of expanding opportunity.

Upper Columbia Drainage—Intermountain Areas of Montana and Idaho

The intermountain region of Montana and Idaho has received, in relation to its available farm lands, a very heavy quota of Great Plains migrants. The pressure resulting from such an influx of new population should hasten certain types of development that ordinarily might not occur within the near future. It seems very likely now that the next 10 years will have brought about the utilization of almost every available acre of economically cultivable cropland in that area. Some of this will be in blocks of several thousand or more acres—like the Rathdrum Prairie tract in northern Idaho and a similar area in the vicinity of Missoula. One or more large storage reservoirs, probably including the Flathead River, to provide flood control and power, should be in the picture 10 years hence. The whole economy of this region should then be based on a well-integrated use of its farm lands, forests, minerals, and scenic attractions. It seems most likely that the people will be drawing their incomes about equally from all four sources.

The water conservation and irrigation work in Montana is considered especially significant. Here the State-Federal cooperative program has done a great deal to check disastrous trends and to make the land economy more secure in many parts of this great agricultural State. A series of planned projects of various degrees of magnitude has provided water for new and supplementary irrigation purposes, permitting more intensive development in valleys, shift of outlying lands from uneconomic dry farming to more extensive use, and putting into effect for large areas a more secure land-use pattern, in which the irrigated valley and surrounding range complement each other.

The strategy of inland locations for certain industries important in the national defense should lead to an industrial growth in these areas to balance that in agriculture.

Puget Sound—Lower Columbia

This area now contains about half of the region's manufacturing capacity. Within a decade or two, there should be a considerable change in the type of manufactures. Depletion of the virgin stands of old-growth Douglas fir timber will inevitably result in a decline of lumber output. This should be offset, at least in part, by an increase in the output of pulp and paper, alpha cellulose (wood pulp used for rayon), wood plastics, and other chemical products. Increased shipbuilding brought on by the present world war may conceivably lead to the permanent establishment of this industry in the area. There are also good possibilities for the establishment of new metallurgical industries—iron and steel, alloys, aluminum, magnesium, chromium,

etc. Incidentally, this increase in the volume of heavy manufacture, and the need of lowest cost transportation (for bulk materials particularly) may ultimately lead to the interconnection of the inland waters of Puget Sound with those of the Columbia River—providing an inland waterway system extending southward and eastward to the heart of the Pacific Northwest hinterland, as well as northward and westward to Alaska. The further growth of secondary industries should, of course, follow closely on the heels of the heavy industries.

Agriculture will also expand considerably in this area through the clearing of suitable lands now covered with stumps, brush, and timber. It is important that this extension of agricultural land be confined to the good soils and to locations where roads, schools, and other public services can be provided at reasonable cost. Rural land zoning and other forms of public and cooperative land-use control should be developed throughout the entire region; they are particularly applicable in this area with its diversified, metropolitan-industrial-agricultural-forest-recreational uses of land and water. As in the Willamette Valley, there should be an extension of supplemental irrigation of crops and dairy pastures.

Other Projects

Outside of the more compact areas mentioned above, there will be in use a large number of smaller projects, all designed to conserve and control water, improve land use, and thus help to stabilize the economy of various areas of the region. While the current programs of small projects have been locally effective, they represent little more than a beginning toward the desired stabilization of land use.

The range lands, within 10 years, should be well on the way toward full rehabilitation under private and public management systems fully cognizant of their responsibilities for maintaining conditions that permit sustained production of forage for livestock and wildlife.

Progress has been made in various localities in the reclamation of land through stump clearing. Costs have been lowered and the work accelerated largely through use of heavy tractors and bulldozers, but there is need of more rapid classification of lands and of development of more comprehensive projects and aids in economically desirable clearing.

Flood control, diking, and drainage projects have also made available, to a relatively limited extent, desirable new lands in several parts of the region. More areas and projects remain to be investigated. The promise of reclamation through these means, however, does not seem to be nearly as great as through irrigation and clearing.

If an action program can be derived from the exten-

sive investigations of mineral fertilizer resources and uses by the Congressional Joint Committee on Phosphates, it should have far-reaching effect on agriculture, land use, and the maintenance of soil fertility, as well as on industrial development, in the Pacific Northwest.

The agricultural land-use planning program of the Department of Agriculture, States, and counties should also result in important adjustments and improvements in agriculture and land use, as well as in the assembly of vital information for land-development programming.

Still another research program of potentially great importance to Pacific Northwest agricultural development is that of the regional research laboratories of the Department of Agriculture. Beneficial results should be felt not only in agricultural market development, but in farm production and in industries related to agriculture.

The Generalized View of Future Land Development

The precise location and the limits of feasible development of new agricultural lands cannot be determined at the present time. As indicated previously, better information is now being collected by the Bureau of Agricultural Economics and the National Resources Planning Board. Studies now available as the result of work done by the Farm Security Administration and the State planning boards do give a rough indication of the location and extent of potential settlement areas. Figure 3 shows this generalized and tentative picture.

Forest Areas

The need for organizing forest operations on a sustained-yield basis is commonly admitted at the present time. Within 10 years, most of the commercial forest lands should have been definitely tied into a system of operating units to serve as the basis for ultimate stability of the industry. Such units cannot be plotted on a map at the present time, because each will be subject to detailed study and negotiations. It is possible to delineate a typical area that has already been studied. Figure 2 illustrates the general scheme that should be worked out by cooperative action of private forest owners and the Federal and State forest services.

Current forest programs have accomplished much toward conservation of a substantial part of the Pacific Northwest region's outstanding forest resource. Some notable advances are being made: In the field of protection from fire, toward improved forest practices, and in a few working circles toward sustained-yield operations. The exhaustive investigation of the Congressional Joint Committee on Forestry will, it is

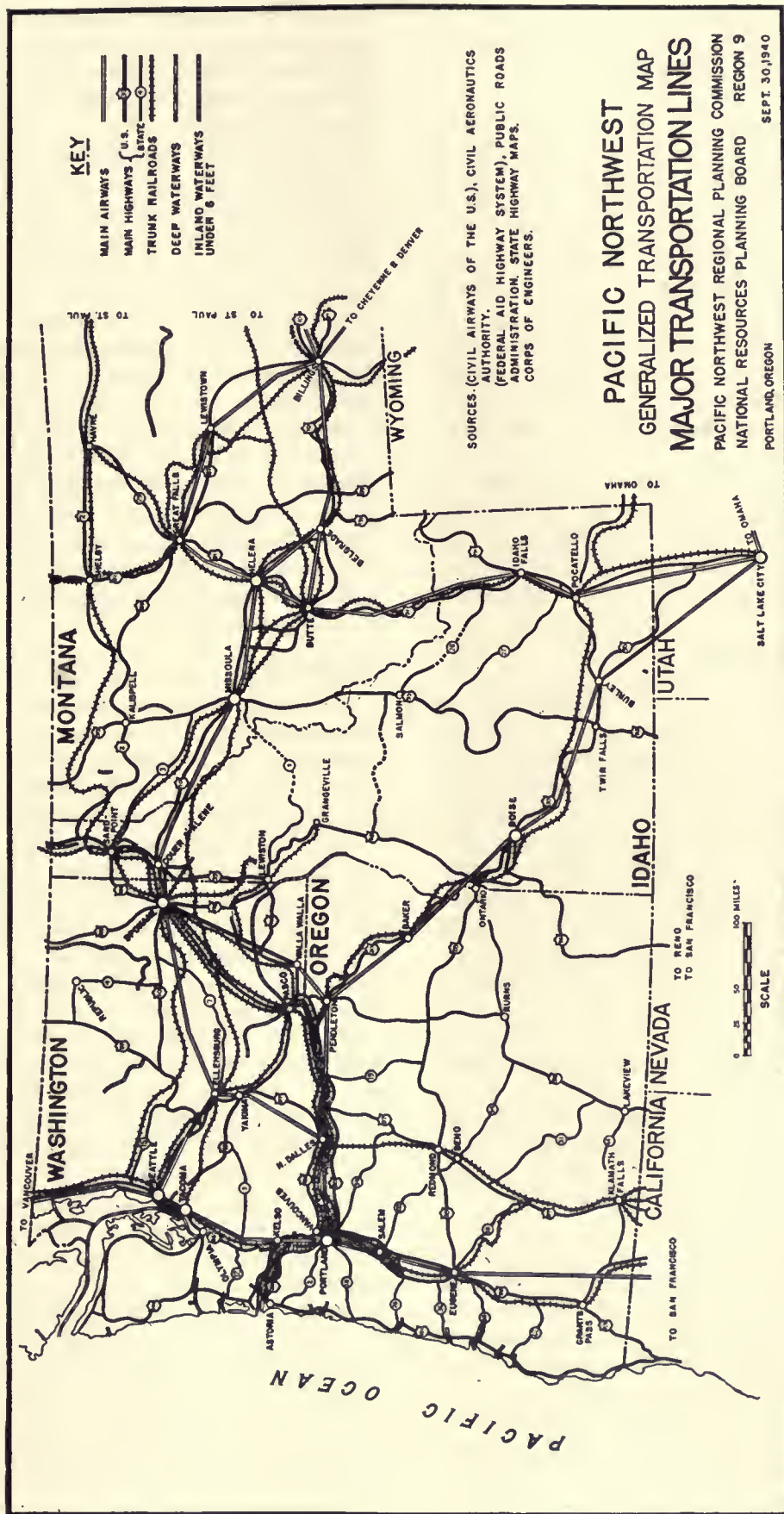


Figure 5.—Major Transportation Lines

hoped, clarify public policy and bring into effect an action program commensurate with the magnitude of the regional resource and the values at stake, both directly and indirectly.

There are at present about 7,000,000 acres of nonstocked cut-over and burns in the 4 States. These nonproducing areas comprise 17 percent of the forest land of western Washington and 13 percent of that of western Oregon. The proportion elsewhere is less, but the lands are potentially much less productive than those of the western Douglas fir region. A large part of this nonstocked land is of a quality that would justify rehabilitation by planting or by some other method. Within 10 years, this area should have been placed under stable ownership, and definite work should be under way to restore it to productive use.

In addition to this work of restoration, there should be in operation some system to prevent abandoned forest lands from lying derelict for years as they now do. Action by the States in taking over the management of such critical areas should be quick and automatic.

Regional System for Transmission and Interchange of Power

The foundation lines for a Pacific Northwest power grid system are already under construction. A recent Executive order has placed the marketing of energy from both Bonneville and Grand Coulee under a single administration. This step should be supplemented by a congressional act, which would provide the Columbia River Power agency with a more flexible, corporate structure, better adapted to business operations, and supply it with well-defined policy and with financial, research, and other powers essential to the marketing of power on an energetic and progressive basis.

If the regional power program proceeds with reasonable speed, the main features of the grid system should be well advanced within 10 years. The exact location of extensions and interconnections will be determined by demand growth and other factors that cannot entirely be foreseen. The type of general layout, however, that seems most probable is indicated by figure 4.

The Federal power program is unquestionably having a penetrating and vital effect on the regional economy. The production of Bonneville's first 6 (of 10) units is coming in during the next few years to meet the normal growth in power use in its area. It is also serving as a stimulus in the establishment of new basic industries of a kind hitherto lacking in the Pacific Northwest. The first 3 of Grand Coulee's 18 units are also coming in during the next 2 years to serve similar purposes. These units, plus others to

follow at both plants, represent vital additions to the energy available to the Nation to meet defense needs. The power-using industries and the energy resources should be brought together as promptly and effectively as possible.

The Bonneville organization has made significant progress in power system planning and construction, in interconnection with the view of stabilization of production and use, in interchange of energy, and in marketing and sale of available and prospective output. Prospective accomplishments for well-integrated operation, far greater in magnitude, lie ahead.

Important private programs, based directly on the Federal power program, may have progressively expanding effects. The recent establishment of a large aluminum metal plant should be the forerunner of a number of fabricating, processing, and alloy industries. The small iron and carbide industries, in course of establishment, should prove to be advance guards, respectively, of other basic and secondary metal and chemical industries. The chain-like relationships of products and byproducts of such industries are well known.

Transportation

Progressive improvements rather than dramatic new features are likely to be the chief characteristics of transportation development within the next 10 years. The region is already well crisscrossed with a network of railways, highways, and airways (fig. 5).

Completion of the navigation features of the Bonneville project has been followed by a new upsurge of inland water traffic on the Columbia River. Further deep-water and inland navigation improvements, under way and proposed, including the Columbia-lower Snake trunk, should aid in bringing new resource and industrial developments within economic limits.

The great distances between the more highly developed areas of the West (Puget Sound, lower Willamette, San Francisco Bay, Spokane-Inland Empire, Boise-Snake, Butte-Anaconda-Helena-Great Falls, Salt Lake, for example), as well as current national and world trends in aviation, will, no doubt, be a very powerful stimulus to the growth of air transportation and facilities therefor in the region.

The development of Alaska and the establishment of closer relations with Canada and Latin America will stimulate transportation developments of interest to the Pacific Northwest; overseas and coastal navigation; international highway links; and more extensive air services, particularly to the farther northwest. Because of all of these factors, it is safe to expect a considerable expansion of airport and airway facilities and some expansion of other port and terminal facilities in the region.

National Defense

Of the Nation-wide programs, that for national defense should have special and far-reaching effects on this and other regions. Beyond a short-run need of increasing production at present plants, located largely in the Northeast, there should be decentralized location of new and branch plants in various regions on the basis of strategic, resource, material, labor, market, and other considerations. In the Pacific Northwest, strategic, energy, and material factors are particularly favorable to certain groups of industries.

The national defense does not represent an entirely new or separate problem from the standpoint of regional development. Defense considerations must permeate plans and programs in nearly all resource and development fields. The immediate importance of defense and the urgency of defense measures will change emphases and priorities in development programs rather than the development aims and programs themselves. There lies in the defense program some promise and opportunity for more rapid development of certain resources needed both for peaceful progress and national security—the region's great hydroelectric power, or essential minerals, for example. The defense activity also carries the threat of dislocation upon its ultimate cessation or slackening; it is essential that development plans and programs cover the readjustment to more normal activities and progress.

In considering development in the interest of national defense, it is necessary to keep in mind the concept of total defense. The less military items in the list of needs for national security cannot be lightly considered. Maintenance of resources in land, agriculture, forests, and in human health and morale, as well as in energy, labor, and industry, is a vital part of the total scheme.

Industrial Location Pattern

Since the heavy power-using industries are likely to be the most important factor in the region's industrial growth and a policy of uniform wholesale rate has already been adopted for the sale of power from the Federal system, there is no need for these to concentrate at or near the generating plants. Transportation, raw material availability, water supply and utility services, climatic conditions, labor supply, and other factors are likely to be most important in determining the location of industries. For certain types important to national defense, relative security from air attack may be a deciding factor. In order to make all relevant information readily available and to help overcome the inertia which has led in other regions to extreme concentration, plant site surveys and location studies covering the entire region are being initiated by the Bonneville Power Administration, the National Resources Planning Board, and cooperating agencies.

These and other related investigations are pointed toward the widest practicable decentralization of industrial activity in the interest of a well-distributed regional growth, and the maintenance of good living conditions for workers. Marked effects on the geographical pattern of industrial activity should be apparent in 10 years.

The Pattern of Urban Growth

In common with all other cities of the country, the urban communities of the Pacific Northwest have central areas that are blighted and a sprawling fringe that keeps pushing out in haphazard fashion beyond the city limits. This movement creates extremely serious problems for municipal government and for the owners of downtown property. The people who move to the fringe are likewise handicapped by inadequate school and utility services.

The urban picture 10 years hence should not show the effects of another decade of this destructive movement. The remedy to be obtained through replacement of blighted central areas with low-rent public housing projects should be in evidence in every city. Fringe settlement may also have been improved by the application of controls and planning which would concentrate it in a reasonable number of Greenbelt communities.

Cultural and Social Programs

In the Pacific Northwest, outstanding progress has been made along certain educational lines closely related to regional development. Through the Northwest Regional Council, notable work has been done in the stimulation of regional research, and in the preparation and use of regional and resource materials for educational use. In the latter activity, the (National) Commission on Resources and Education has selected the Pacific Northwest as a demonstration area and has cooperated in the establishment of "resources and education workshops" for teachers. Continuation of such activities should bring about substantial progress in understanding of and adjustment to the regional environment.

A number of programs of great importance in human advancement are vital in the region, but should more properly be covered in a national rather than a regional summary. These include such national programs as agricultural adjustment, land-use planning, soil conservation, farm security, works projects, reemployment, social security, youth, housing, and national defense.

Recreational Development

Beyond its cultural aspects, recreation is highly important in the region from an economic standpoint. The scenic and outdoor recreational resources—forests,

mountains, plains, deserts, lakes, rivers, beaches, and primitive wildernesses—are of national as well as local significance; their use is a material factor in maintenance of a balance of payments with the more populous and industrialized parts of the country.

Therefore, it is essential that the coming decades show marked progress in the use and enjoyment of these resources. Policies and programs should be perfected or materially advanced for the preservation of outstanding scenic and primitive areas, and also for the further provision of well-designed facilities for the use of those resources—roads, trails, shelters, for example. Special effort should be made to see that each type of area is accessible at the season in which people wish to go there—mountains in both summer and winter, desert in early spring, alpine areas in later summer, etc.

Progress should be made toward harmonious multiple use of land resources for various purposes, including those of recreation. In most of the areas of the region, including many of considerable scenic worth, it is necessary to have policies and plans that will permit simultaneous, nondestructive usage for a number of purposes: Timber growing and harvesting; agriculture and grazing; mining, industrial, commercial, and community development, as well as recreation. The degree of success attained in harmonious multiple use will be a measure of the ability of the people of the region to adjust themselves to their environment.

Need of Public Planning

Many programs and projects, large and small, are influencing the progress of the Pacific Northwest. The more significant of these from the viewpoint of regional development are those that have, or promise to have, the deepest effects on the regional economy—those that react on the foundations of that economy, primarily on resources and their effective management and use. If the basic, wealth-producing activities are stimulated or built up the erection of the superstructure of subsidiary and service activities is practically assured. Programs in the basic fields are quite generally too broad to come within the purview of individual enterprise and are the concern of the people as a whole. Here as well as in the supporting framework of essential public services in the superstructure, public planning and programming are most urgently required.

IV. The Role of Public Policy and Public Works; Problems, Programs, and Methods of Coordination

In both national and regional development, it is essential to recognize the importance of effective use of all available resources, also to see the key place of public policy and public works in this connection. If

we are to go ahead—if we are to add constantly to our income, and to improve and broaden our standards of living, and to reduce our unemployment of capital and labor—we must make best use of our resources. This will involve continuing capital outlay in public and quasi-public works as well as in private industry. The growth of industry is not only highly dependent upon market expansion but to a considerable extent upon the parallel development of creative and regenerative public works utilities, and services. The full employment of resources—men, science, technology, money, plant, machinery, materials—is not possible without construction and reconstruction of public works and quasi-public works.

Recognition of what the region has, where it is, and where it should go, and of the gaps in past progress and the barriers to future advancement is essential to a realistic determination of its major deficiencies and needs in policies, works, industries, and services and of the possible ways of meeting them.

It should also be understood, however, that it is not only these more or less special conditions and objectives for the region that are vital but also the common conditions, trends, and goals of the whole country. A large share of the progress of the region depends upon national movements and rates, rather than upon conditions within the control of the people of the region in themselves. But regional resources must be used, regional deficiencies filled, and regional barriers lowered, if the region is to move ahead, in mesh with other regions and in harmony with national progress, toward a higher and more secure position.

Uses of the Design Concept

In all of these planning and programming efforts—from those for simple projects, through large multiple-use projects, to large regions—there is need for a constantly widening use of the principles of design. In planning for the single, one-purpose project, and even for the smaller area, design involves more completely physical factors and consequently is more concrete, more tangible. For a building, for example, the purpose of design is to adapt it to the functions it will have to perform—living or working quarters, handling or storage of materials, etc.—and to enable it to withstand physical forces—gravity, wind, and various loads. For the small community, design is primarily a matter of arrangement of physical facilities—living, industrial, commercial, transportation, educational, recreational, etc.—to suit community functions; but the importance of social and economic design should be more generally recognized even in this instance. For the large, multiple-purpose project, all of the factors mentioned must play their part. But additional important factors must enter into the design: The relations of function to

function and unit to unit; the relations to other projects in a system; the relations to auxiliary projects; the relations to markets for output; the relations to economic return on investment; the relations to social and economic benefits, and so on.

For example, in connection with the Pacific Northwest's largest project, Grand Coulee, the complete plan is becoming recognized as involving the design of many things beyond the primary irrigation, power, and water, control features: Of land use; of farm subdivision and farm economy; of a system of communities and facilities for transportation and distribution; of individual communities and community additions; of basic facilities for local industries; of recreational facilities; of public works of various kinds; and of governmental organization and machinery to meet new needs. Such design goes far beyond a single designing organization to perhaps two score agencies that must share in the effort and whose work must be correlated toward an effective over-all design for the area.

It is not a great step from such a concept of project and area design to one for a State or a subnational region. The fundamental criteria are not different. Good design must still be based on the functional considerations. Simply stated, the region should be designed as the home and environment in which a proper proportion of the Nation's people may live and produce. It should be designed as an economy—without rigid limits, not too sharply set out, not too self-sufficient, but in effective, complementary, and flexible relationship to the other regional economies and to the whole national economy.

In design for the regional development, the economic and social factors will predominate. Design must also be applied in the field of public administration to facilitate coordination in the development and execution of over-all programs. But selected, generalized physical features are also subject to design on a regional basis: Land and water and their development and use; the sustaining material resources; the production of energy; the circulatory systems of transportation, energy transmission, and distribution. Improved patterns of population, community, and industrial location are also susceptible at least to indirect influences of rational design—through such measures as land-use planning, resource development, transportation and transmission-line locations, governmental aids and services, and educational work.

If democracy is to avoid break-down under the sheer weight of unsolved economic problems in this technical age, it must be made increasingly practicable for the citizenry clearly to understand their basic problems. A rational design for utilization of resources—provided its fundamentals can be set out in simple yet fair and realistic terms—will, in most cases, sell itself to

the majority and thereby obviate the need of any more than the minimum of governmental intervention or compulsion. The full benefits to be realized from the broad application of principles and procedures of planning, design, and programming, on a decentralized basis and with the collaboration of all interests concerned, are vital enough to warrant far greater use than has yet been attempted.

Interrelation of Public and Private Programs

It should be borne in mind that the regional program, to be realistic and effective, should not only include public projects, but should take cognizance of significant private projects as well. The public programs are, as previously intimated, essential to regional development, either directly or as part of the basis of private development. Private programs—financial, industrial, commercial, service—and private attitudes and cooperation will also have much to do with ultimate results in regional development. Since there is no centralized control of public programs in the region, and since private programs are subject only to partial public controls (which, furthermore, are generally negative rather than positive), cooperation is of the essence in the development and acceptance of the major elements of a regional program.

It does seem feasible for both public and private interests to cooperate, increasingly, in program planning and design. It can happen; cooperation of this kind has been had in certain fields: The Pacific Northwest Drainage Basin Committee (in common with other such committees throughout the country) in 1937 submitted a comprehensive program for drainage basin development. A broadly representative Pacific Northwest Land Advisory Committee likewise agreed on a number of recommendations covering, substantially, the range of a general land program. In a forest resources study, sponsored by the regional planning commission in 1938, departmental, State, industry, and public representatives substantially agreed upon a statement of the situation and a minimum program of Federal, State, and industry action toward solution of the regional forest problem. This type of cooperative effort might be broadened and extended to cover other individual fields and to consideration of the over-all regional program.

It is realized that the next steps—the follow through—after the formulation of a program are the more difficult ones. The initial step of planning and programming must be taken in any case. It is necessary, then, to look to improvements in governmental and economic processes that will facilitate action on generally accepted programs and further the exercise of some degree of unified management and coordination

in the further design, expansion, and actual effectuation of such programs.

The Six-Year Program of Public Works

An all-inclusive 6-year public-works program would, of necessity, embrace the programs of every governmental entity—Federal, State, county, district, municipal—within the region. Such a complete program is not practicable of attainment, but it is desirable to have as a base the programs of the Federal development agencies, the States, the more important development districts, and the more important (or at least typical) counties and municipalities.

A 6-year public-works program, for any governmental agency, consists primarily of: (1) an inventory of desirable and feasible projects, arranged to show preferential priority, and proposed construction cost for each of the 6 years; (2) a narrative justification for each project; (3) a financial analysis, showing relative financial feasibility of each project, capital cost, annual maintenance and operating costs and their effect on tax rates, also the effect of the program as a whole on indebtedness and taxation.

For the Pacific Northwest region, it is anticipated that the 6-year program will consist primarily of a consolidated inventory of the construction projects of regional significance of the various Federal and State agencies within the region. It may include also local projects or groups of projects of like significance. Beyond the inventory, a series of narrative sections may cover: background of program and projects; interrelationships of projects; justification of major projects; means of effectuating the program; relationship of the program to regional needs and progress—to resources, employment, industry, economic opportunity, and so on.

Progress in State and Local Programming

At the present time definite progress is being made in the long-range programming of State public works. In three of the four Northwest States—Idaho, Montana, and Oregon—6-year programs are in the course of preparation and reports are expected to be available before legislative assemblies open at the beginning of 1941. In Idaho, work on the programming project follows a general State-wide study and report on public works plans and programs. The Montana State water conservation and planning boards have made substantial progress toward fundamental and realistic public works planning and programming, particularly in the fields of land and water use, through the State water conservation program and through a State-wide study of opportunities and needs for land settlement and land-use adjustment (based quite largely on the county

agricultural land-use planning project). In the fourth State, Washington, a similar activity is under consideration.

The city of Spokane has recently completed and published a 6-year program of public works which, together with several other demonstration projects carried out by various municipalities throughout the country, should provide a valuable guide to other cities.

On the basis of these State programs, the plans and programs of Federal developmental agencies, of drainage basin and other general regional plans and programs, and other available data, it is intended to pursue the preparation of a regional program along general lines discussed hereinbefore.

Administrative Correlation of Plans and Programs

Progressive, orderly, and well balanced and distributed development of the region calls for very careful attention to certain aspects of public administration. It calls less for new administrative agencies or machinery than for improved machinery for the correlation of development work—for the improvement of procedures and habits for the interchange or clearing of important information, investigations, and plans; for bringing and holding together the vital parts of broad development programs throughout the complex procedures of planning, programming, budgeting, approval, and execution. Without such clearing and correlating work on a well established and recognized basis at State, regional, and national levels, the most needed and worthy of development programs tend to deviate from objectives, to lose essential elements or relationships, or even completely to dissolve.

The administrative factor has long been recognized as a most important one in the problem of regional development, both by the National Resources Planning Board and its predecessors and by the regional planning commission. The National Resources Committee's study of regional factors in national planning and development¹ gave a considerable amount of attention to this problem. In its 1935 study the regional planning commission was asked not only to report on the future prospects of the Pacific Northwest but upon types of organization that should be set up for the planning, construction, and operation of certain public works in that area.²

At that time—after recommending continuation of planning organization on a State and regional basis, continuation of development construction activities by the specialized technical bureaus, and a special cor-

¹ *Regional Factors in National Planning and Development*, National Resources Committee, 1935.

² *Regional Planning, Part I—Pacific Northwest*, National Resources Committee, 1936.

porate organization for power system operation—it suggested establishment of a coordinating committee in the region. Suggestion was made that this committee should be representative of the Federal departments concerned with regional development; that it and the regional planning commission³ be closely interlocked or associated; and that it should aid in coordination of major features and priorities of plans, programs, and projects for conservation and development in the region.⁴

The same administrative problem with respect to development has been recognized also in the regional planning commission's current study of migration and economic opportunity in the Pacific Northwest. In connection with this study, the regional planning commission was asked to arrange for a study of the land and migration problems of the region and also to assume leadership in carrying on the survey and in providing a channel or clearing house for the more effective coordination of Federal and State activities relating to those interlocked problems that have a bearing upon migration, settlement, employment, land and water conservation, and public works.⁵

In this study, the regional planning commission sought the assistance of advisory groups—particularly that of a land advisory committee and a subcommittee on population problems. Members of an executive or steering committee of this advisory group—composed of representatives of the Federal departments or agencies concerned with land and general development—have sat with the State planning representatives on the commission in the consideration of the problems,

the study, and the report. In general, this arrangement resembles that suggested for coordination by the earlier report. It provides, informally, for a certain amount of clearing of general aims, programs, and projects, between representatives of the departments and of the States.

Recognizing the difficulty of coordination of plans and programs for regional development, the regional planning commission has been loath to recommend or to attempt to set up any elaborate machinery for the purpose. It has believed it desirable that procedures, techniques, and habits of cooperation be developed and expanded on the basis of experience in general planning, and in the development of plans and programs in such fields as land development, drainage basins, forest resources, public works, and so on. The experience of the Bureau of Reclamation in connection with the cooperative joint investigations for the Columbia Basin irrigation project should also prove valuable in the formulation of procedures for coordination of development programs.

Accordingly, the regional planning commission has suggested in its latest report on the general subject of regional development⁶ the need of establishing more intimate working relationships between agencies and of coordination of administrative action relating to development, both in the region and in the National Capital. To move toward these ends, it suggested the participation of Federal development agency representatives with the State planning members of the regional planning commission in consideration of regional development programs, and that devices and staff for intradepartmental coordination of policies and programs be developed as rapidly as possible by those departments entrusted with resource management functions in the region.⁷

³ The Pacific Northwest Regional Planning Commission, organized in 1934 as an association of the State Planning boards and the National Planning Board for regional planning purposes, includes in its present membership representatives of the Washington, Idaho, and Montana planning boards, Oregon Economic Council, and National Resources Planning Board.

⁴ *Op. cit.* pp. 12-14.

⁵ *Migration and the Development of Economic Opportunity in the Pacific Northwest*, Pacific Northwest Regional Planning Commission, 1939.

⁶ *Ibid.*

⁷ *Ibid.*, pp. 53-57, 60.



**PRELIMINARY STATEMENT, REGIONAL DEVELOPMENT PLAN
ALASKA: REGION 10, JUNEAU, ALASKA, 1940**

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Report of the Alaska Planning Council

DR. HUBERT A. BAUER, *Consultant, Region 10, National Resources Planning Board*

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FOREWORD

Since no field office has yet been established in region X, Alaska, Dr. Hubert A. Bauer, consultant to the National Resources Planning Board in Alaska, was given the assignment of preparing a regional development plan for Alaska. In carrying out this assignment, Dr. Bauer had the benefit of the data at hand in the office of the Alaska Planning Council, and the various Federal and Territorial offices located in Juneau.

Due to the limited time for preparation of the development plan, during which no meeting of the Alaska Planning Council was scheduled, the approval of the whole council was not obtainable, but the plan was submitted to the majority of the members of the council, residing in Juneau, and their suggestions and revisions were incorporated in the development plan.

PRELIMINARY STATEMENT OF REGIONAL DEVELOPMENT PLAN

ALASKA

INTRODUCTION

The Alaska Scene

Numerous elements are combined to make up the complex background of the Alaskan scene, against which developments of every kind are taking place in Alaska.

For the purpose of planning, the most essential of these elements may be briefly enumerated as follows:

1. A variegated physical background, far from being fully explored.
2. A population too small in numbers and too weak in capital resources to cope with the problems of the vast area it occupies.
3. An unbalanced stage of economic use of resources.
4. Major industries largely controlled by nonresident interests.
5. A weak Territorial status.
6. Complex, long-distance administration.

Clear recognition of this complex setting is a first requirement for efficient, coordinated planning.

The orientation chart following this page attempts to illustrate this necessity by showing the relationships existing between the Territory's major resources, the present uses made of these resources, and the various agencies engaged in promoting or regulating these uses. The chart serves a second purpose. It indicates the organization of the material used in presenting this development plan, namely the approach through basic

resources, leading on to industries (users of resources), then to the governmental agencies concerned with both, resources and industries, and finally to the general objectives and plans pursued by these agencies.

Striving for simplicity, the chart does not claim to include all the aspects and details of a development plan. It is, at best, a skeleton around which the details of the report have been draped.

While the chosen approach by resources (pt. 1) covers all phases of resource development, it cannot embrace all the functions of governmental agencies. It has, therefore, been found expedient to review most development projects by selected functional fields (pt. 2). This recapitulation, in summarizing scattered plans under one head, has the advantage that the need for coordination of development work planned by the various agencies and groups can be shown more clearly.

In part 3, an attempt is made to circumscribe briefly the modest role that the Territorial government plays in the development process.

The timely and unusual significance of military development as a stimulus to economic development has received general treatment in part 4.

Objectives, plans, and projects were obtained from authoritative sources. These contributions, made by numerous Federal and Territorial agencies, are herewith acknowledged.

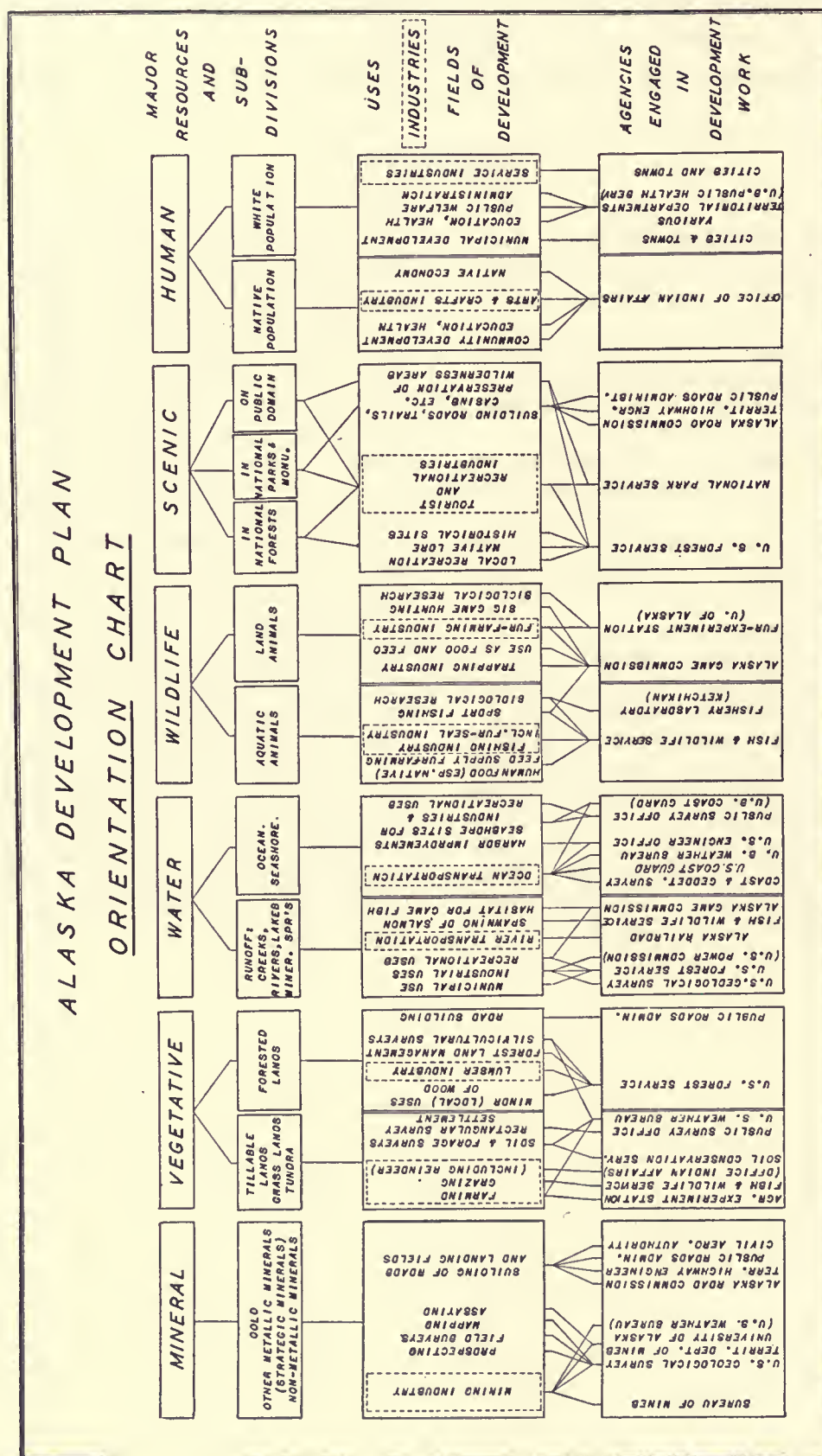


Figure 1.—Alaska Development Plan

PART 1. RESOURCE DEVELOPMENT

Vegetative Resources

Approximately two-thirds of Alaska's total area of 591,000 square miles is covered by forests, grassland, or tundra. This huge area thus constitutes a far-flung resource of timber and range, practically all in Federal ownership. Very little of this vegetative resource has so far been put to direct human use.

Forest Lands

While Alaska forest lands serve multiple purposes, namely (a) timber supply, (b) support of wildlife (c) storage of water, (d) recreation, and (e) settlement, only plans and projects referring to their vegetative aspects are discussed here.

Timber Resources

State of Development.—Only the national forest area, primarily the Tongass National Forest, yields commercial timber, most of which is used locally for common lumber and piling. Only clears produced from selected timber can compete in the United States and foreign markets; spruce uppers are shipped out of the Territory in increasing volume. At present about 50,000,000 board feet are cut annually. Two large lumber mills, three middle-sized ones, and a number of small mills, most of which operate intermittently, constitute the present modest lumber industry of Alaska.

Although the forest resources of southeastern Alaska offer excellent raw material and manufacturing conditions for pulp and newsprint, economic conditions have not yet permitted the use of the resource for this purpose.

Objectives.—Wider utilization of commercial timber resources includes the following objectives:

(a) Lands most suitable for the growing of timber to be dedicated to the continuous production of wood.

(b) A permanent and convenient supply of timber to be furnished for local consumption, with such additional supply to the local sawmills for the general lumber markets as may be needed to justify sufficient milling facilities and provide year-round operations.

(c) Promotion of a pulp and paper manufacturing industry commensurate with the available timber and water-power resources to be developed and maintained.

(d) Encouragement of minor woodworking industries, for the manufacture of specialized products from spruce, hemlock, cedar, and birch, such as small-dimension stock for furniture making; cedar shakes and shingles; spruce for airplane parts; various specialties—cedar chests, venetian blinds, barrel staves, battery

separators, drafting boards, oars, handles, toys, and so forth.

(e) Greater use of local lumber for building and construction purposes, for which imported fir lumber is now preferred.

Plans and Projects.—(a) Careful segregation of all forest lands into pulp timber allotments, and general use areas, including local use allotments.

(b) Comprehensive studies and field surveys by competent specialists of all problems involved in the extension of the Pacific Northwest and British Columbia pulp industry into southeastern Alaska, in connection with timber and water-power surveys.

(c) A comprehensive survey of the possibilities of minor forest-product industries in Alaska.

(d) Establishment of a wood-treating plant within the national forest area for use by Federal construction agencies as well as by private firms; a plant large enough to handle dock pilings and structural timber.¹

Agricultural and Grazing Land

Farm Lands and Adjacent Grazing Lands

Only rough estimates are available of the total area of tillable lands in Alaska. If limiting criteria be applied to the definition of the terms "agricultural" or "tillable," namely, soil quality, climate, drainage, topography, or accessibility, the frequently quoted total tillable area of 65,000 square miles appears to be open to considerable revision. Only subregional land-use surveys will—in time to come—determine which areas can and should be assigned to use by future farmers. The need for exact knowledge of all potential farm land is, however, not imperative, as occupancy of farm lands at this time is not a matter of mere choice, but rather one of extremely careful selection.

On the other hand, it is imperative to have full information on those restricted areas within which farm settlement has already been given an impetus, or within which settlement is likely to occur during the next decade or so, in accord with such other economic development as can be reasonably expected. These areas are necessarily in the vicinity of or within easy access to existing centers of population. Plans for agricultural development would, therefore, focus upon the following subregions recognized as being the most suitable and most logical for early occupancy:

¹ Reference is made to earlier examination of this project made for the Alaska Railroad by Mr. George M. Hunt of the United States Forest Products Laboratory Madison, Wis., 1933, also to reports on engineering details submitted by Mr. Rawson, engineer, Yeon Building, Portland, Oreg.

(a) Within the Cook Inlet area, the broad open Susitna Valley, including the lower Yentna Valley, within easy access from the Alaska Railroad; the "Homer country" at the southwestern tip of Kenai Peninsula; selected areas on the west side of Kenai Peninsula.

(b) The Tanana Valley in the vicinity of Fairbanks.

Objectives.—The agronomic phase of the agricultural problem has been well covered by the agricultural experiment stations of Matanuska and Fairbanks. Three years of practical farming in the Matanuska colony have been a valuable additional experience in agronomy, to say nothing of other experiences gained from the colonization experiment.

Future development plans must be based on comprehensive, cooperative land-use surveys and studies, to be undertaken in all the subregions listed above, along the lines of the now completed Matanuska land-use survey. In the Matanuska land-use survey, many component parts of the picture had already been explored or were known from 3 years' farming: A road system had been built, and social improvements had been developed. This is not true of the other regions, where only rudiments of such future development are in existence.

Grazing Lands Outside of the Agricultural Areas

Grasslands for Cattle and Sheep.—The vegetative resources of Alaska include considerable areas of excellent grasslands, many of which can in the future be used for large-scale raising and breeding of meat-producing animals, especially cattle and sheep, with hides and wool a welcome by-product. Developments in bleak, wind-swept Patagonia, or on the Falkland Islands may serve as precedents for such possibilities.

These potential range lands are scattered over a wide area, including parts of the Alaska Range, the Chugach Range, the Alaska Peninsula, Kodiak Islands, and the Aleutian Islands. Development plans for the proper future use of this resource would call for definite range surveys, especially determination of forage conditions and carrying capacities, also a study of possible conflicts with wildlife in those areas.

Tundra Lands for Reindeer.—With the passing of all reindeer into native ownership, a new perspective has opened for sound, well-managed use of the huge expanse of tundra, which covers most of northwestern Alaska. Proper use of this resource will involve clear recognition of past mistakes made in the management of range as well as of herds; it will be associated with plans for the establishment of a new order for the Eskimo population, which may well be termed a "reindeer economy." While close adjustment to a meager

natural background has always been a necessity and a lifesaver to the individual Eskimo, correct adjustment to the tundra through the medium of reindeer may be the ultimate economic salvation of the entire Eskimo race.

The problems of correct and sustained use of the natural tundra vegetation are manifold. They are not confined to the natural resource but concern also the native human resources of the reindeer country. Even the welfare of the white population is to no small degree linked with the welfare of the Eskimos.

General plans: The necessary steps that will lead to proper use of the resources referred to as tundra lands may be listed as follows:

(a) Range studies to determine forage conditions and carrying capacities of the various reindeer ranges.

(b) Mapping of the reindeer country.²

(c) Training of reindeer herders and general education of the native in the proper use of the reindeer resources.

Reference is made to a later section, "Planning for a native economy," of this part.

Water Resources

The term "water," as used here, does not include aquatic life. It includes the element water only—the sea, rivers, creeks, and lakes—as a medium of transportation and as a resource used for domestic, municipal, and industrial purposes. Plans for the diligent use, care, and control of this ubiquitous resource cover a large field of development. They include all harbor and river works, aids to navigation, and flood-control projects, and concern storage of water for hydroelectric and other industrial uses. The objectives aiming at an increasingly beneficial use of these water resources cover, therefore, a wide range.

Harbors

Alaska's population is largely a seacoast population. Most of its major towns are seaports and the sites of seashore industries. Noncontiguity with continental United States makes proper access from the sea an economic and strategic necessity and improvement of harbor facilities a vital need.

In recognition of this need the Federal Government through the Corps of Engineers has cooperated with the various cities in a Territory-wide program of small-boat harbor projects. The benefits accruing from these constructions to the fishing population, to the fishing industry, and to commercial life, in general, are essential contributions to Alaskan development too obvious not

² This coincides with the necessity of mapping most of this same area for mining purposes.

to warrant a vigorous continuation of this building program. Eight small harbor projects are under consideration at this time, four of which have been authorized, while two have been recommended by the Chief of Engineers. One (Wrangell) has been reported on and is pending, and for one (Petersburg) a preliminary survey has been authorized.

Waterways and Aids to Navigation

Three agencies are engaged in providing safety to navigation:

(a) *The Coast and Geodetic Survey.*—The Survey is spending each year a substantial part of its appropriation for completing the survey and charting of the yet uncharted remote sections of Alaskan waters. In addition to routine surveys of all kinds, the Survey plans to expand aeronautical charting and tidal current survey, and to establish primary tide stations at Seldovia, Anchorage, Nushagak Bay, and St. Michael.

(b) *The Coast Guard.*—In fulfillment of its chief objective, namely, the safety of marine and aerial navigation within the navigable waters of Alaska, the office of the commander of the Juneau district has prepared an extensive building program. The importance of this program for national defense is obvious.

(c) *The Corps of Engineers.*—This agency is chiefly concerned with making and keeping the waterways navigable by removing obstructions and by widening and deepening narrow channels. National defense as well as commercial maritime interests fully justify this undertaking.

River Improvements

While Alaskan rivers are not better behaved than other rivers of the world—in fact, climatic conditions point to the contrary—the need for hydraulic control has not yet become urgent at this early stage of the Territory's economic development, except in a few cases. So far, only three flood-control projects have been completed or are under construction.

Another project for which a survey has been authorized is river-channel improvement for navigation purposes in the Tanana River near its confluence with the Yukon River.

Supply and Storage of Water

The importance of water supply has been keenly felt in the mining industry, where all phases of operation, sluicing, washing, hydraulicking, and dredging of placers, as well as milling of lode ores, call for the utmost utilization of the available water supply. Nothing can better illustrate the dependency of mining

on water supply than the fact that in 1908, due to an unusually dry season, gold production on Seward Peninsula alone fell off by \$2,000,000, or 30 percent. In gold mining areas of scant rainfall, hundreds of miles of ditches have to be built and extensive pumping plants installed to secure a sufficient supply of this precious resource. This demand for a safe water supply will increase with the expected expansion of mining operations. Other present uses of water supply are confined to local, domestic, and municipal consumption and to a dozen small hydroelectric plants.

It is obvious that a development plan must anticipate a water demand of many times the present volume, in accord with expected growth of industries and cities. There must also be anticipated certain conflicts arising from the use of water in regions where a scant supply is shared by and must be apportioned to different users.

Water Power

A happy combination of heavy run-off, good natural storage sites, high heads, and nearness to navigable waters makes the forest areas of southeastern and south-central Alaska an ideal region for the development of low-cost hydroelectric power wherever and whenever needed. While the present use made of this natural asset is limited, it is obvious that the availability of low-cost power will in the future act as a stimulus to further industrial development.

Reconnaissance surveys of projects involving over 800,000 horsepower have been made in the past, but more detailed surveys, including systematic stream measurements and storage capacities of suitable sites, are needed to promote the establishment of industries based upon the use of both timber and water resources. Foremost among these potential users is the pulp and paper industry; second, the mining industry; and third, the electrochemical industry. Water supply investigations in the most important mining regions of Alaska were carried out by the Geological Survey from 1906 to 1921. Within the national-forest area stream measurements and examinations of potential storage and power sites have been undertaken by the Forest Service.

General plans.—

(a) Continued systematic stream measurements in those regions in which development is either under way or is likely to occur in the near future;

(b) Systematic examination of potential sites for hydroelectric development in those regions where utilization of timber, pulp, and minerals is most likely to call for the use of water power;

(c) Establishment of a hydrological branch office of the Geological Survey in Alaska for the purpose of carrying out this program.

Mineral Resources and Mining Industry Stage of Development

It is very difficult to determine the exact life stage of an industry based upon an exhaustible resource such as minerals. Even if more adequate quantitative data were on hand, any estimate of the Territory's mineral reserves would be just another guess. Known facts about past mineral production permit, however, a fair appraisal of the future significance of the use of this widespread resource for the Territory and its resident population. One may deplore the fact that most of the gold produced in Alaska mines benefits nonresident operators and countless others living outside the Territory, but one should not overlook the fact that a modest portion of the mining profits revert to the Territory in form of taxes on production and royalties, wages, and through the numerous channels of an extensive service industry. In planning future development it is, therefore, not so much a matter of how to increase the output as of how to increase the Alaskan share of that output, so that the gradual loss of the resource may be somewhat balanced by more substantial returns.

Analysis of the past mineral production reveals the preponderance of gold, especially since the decline of the copper-mining industry. Approximately 80 percent of the mineral production of Alaska is gold. But in spite of a 69-percent boost of the gold price in 1933 and in spite of various technical improvements such as large-scale dredge operations and the opening of new fields, the total annual output in recent years has remained below that of the steadiest gold-mining period, 1906-18. Long-range planning must anticipate—in these coming years of unusual world-wide unrest—that an adjustment of values which depend upon world demand will eventually take place. It must anticipate immediate reactions of the gold-mining industry to possible fluctuations in the demand for, and therewith, in the price of gold.

The mining of minerals other than gold was until recently discouraged by a general downward price trend of many important metals, especially of silver, copper, lead, antimony, tin, and platinum. Other mineral commodities, including chromite, marble, and oil, have always been produced intermittently. In spite of market fluctuations, platinum and tin have, however, come to the fore and are being produced in increasing volume. Coal production for local purposes is yet small but shows a steady upward trend.

Objectives

In view of this present uncertain and unbalanced status of Alaska's mining industry, the objectives for further development aim at broadening the field of mining, by—

- (a) Prolonging the life of the gold-mining industry;
- (b) Expanding the mining of metallic minerals other than gold;
- (c) Increasing the mining of nonmetallic minerals, such as coal, limestone, marble, gypsum, graphite, barite, sulfur, asbestos;
- (d) Exploring and subsequent mining of strategic mineral commodities, especially tin, chromium, tungsten, and oil.

While credit must be given to Government agencies for the efforts and funds spent in the past for the purpose of opening mining areas by mapping and road building, and while due acknowledgment must be accorded to the many excellent reconnaissance surveys undertaken by the Geological Survey during the past 40 years, it is obvious that the objectives stated above can only be accomplished after intensive exploration of the hitherto unknown or only vaguely known mineral resources of the Territory.

General Plans

Such a program will include—

- (a) Systematic and complete aerial mapping of mineral lands;
- (b) Detailed geologic mapping based upon aerial base maps.

This program should be augmented or followed up by—

- (c) A flexible road- and airfield-building program designed to serve active mining areas as well as to open potential fields;
- (d) Stimulation of further capital investment in mining by clearing the legal tangle of mining claims and by devising an equitable system of mining taxation.

Reference is made here to the proposed trunk road system for Alaska, outlined in part 2 (transportation). Under this plan, a number of important potential mining fields would be opened, in particular:

- (a) The Valdez Creek area between Denali and the Mount McKinley National Park, which has numerous gold lode and placer prospects.
- (b) The Goodpaster area, which is considered rich in gold, silver-lead, copper, antimony, tungsten, and coal.
- (c) The area between Nabesna and the Canadian boundary, which includes the western extension of the mineralized belt surrounding the coast range batholith, with prospects of gold lode, also copper and silver-lead.

Wildlife Resources

Land Animals and Fur Industry

While at the present time the wildlife resources of Alaska, with few exceptions, are practically intact, potential decrease in volume and potential conflicts in the use of the resource are too apparent to be disregarded. Likewise apparent is the fact that wildlife holds a very distinct place among Alaska's basic economic assets, and that its perpetuation and proper use is, therefore, of the utmost significance to the future economic development of the Territory.

Omitting purely sentimental considerations, the field of wildlife has two distinct economic phases: First, as an attraction to an increasing number of tourist visitors, especially big-game hunters, naturalists, and photographers; second, due to the preponderance of fur bearers, as raw material for the pelt and fur industry, which ranks third in value of output among Alaska's basic industries, including trapping as well as fur farming.

The need for better protection of wildlife, growing out of past experiences in the States, led in 1925 to the enactment of the Alaska game law, the administration of which was placed in the hands of the Alaska Game Commission, largely as a law-enforcement agency. Wildlife research is conducted by the fish and wildlife service in cooperation with the Commission. Both efforts, enforcement and research, have apparently suffered from the lack of adequate funds to cover the vast geographic range of wildlife. The problems faced by both agencies are, therefore, growing in volume and complexity, and the need for more complete and more systematic studies of the resource, and of the problems connected with it, is gaining in recognition.

While the Alaska Game Commission is chiefly concerned with the maintenance of a safe breeding stock of all animals, few efforts have been made toward solving the problems of the fur-farming industry. The scientific phase of it, especially the problem of proper diet, is now being studied by the fur experiment station at Petersburg. But other problems, including those of feed supply, feed storage, island farming, marketing, and fur processing have not received much attention.

Objectives.—The primary objectives for the protection and development of terrestrial wildlife resources and of the fur industry are—

- (a) Maintenance of sufficient breeding stock through proper regulation and enforcement, and by restocking;
- (b) Improvement of the quality of furs by proper handling;
- (c) Building up of a more stable fur-farming industry.

General plans.—

- (a) Extension of the research facilities of the Alaska Game Commission.
- (b) Ample restocking program.
- (c) Educational campaign for fur trappers and fur dealers.
- (d) Improvement of predator control by replacement of the bounty system by a paid-hunter system.
- (e) A comprehensive survey of the fur-farming industry, including feed supply and storage problems.
- (f) Participation by the Alaska Game Commission in subregional land-use studies.

Aquatic Resources and Fishing Industry

Early recognition of the potential danger of depletion, followed by regulatory Federal legislation, has made most of the Territory's aquatic resources practically permanent. This is particularly true of salmon, halibut, shellfish, and fur seal. Only one animal, the sea otter, has become actually depleted, by ruthless exploitation during the Russian occupancy; and in spite of complete protection by laws since 1911, no appreciable restoration has been recorded.

State of Development

Salmon.—Among the commercial fish resources, salmon occupies an increasingly important place. Continued study of the life habits of the various species of salmon has led to a number of protective measures, essentially consisting in the limitation of fishing areas, types of gear, take, and the establishment of closed seasons. The high salmon packs of recent years, although subject to minor fluctuations, are sufficient evidence of the general success of the regulations now in force. In fact, the danger of declining abundance of salmon is now completely eliminated, provided present restricting policies are continued. The annual supply is now restored to such magnitude that it supports one of the largest fish-canning industries of the United States, valued at \$40,000,000 in a normal year. Salmon products other than canned salmon amount to \$2,500,000 a year.

Halibut.—Unrestricted taking of halibut to supply a fast-growing market had, by 1923, led to serious depletion of the resource, not only on the inshore banks but also on the offshore banks adjacent to the Southeastern Archipelago. This situation, in turn, led to the establishment by treaty, of the International Fisheries Commission, a regulatory body which, through strict control measures based upon research of the life habits of the Pacific halibut, is succeeding in

gradually restoring the halibut resource to a moderate volume of abundance, and this resource now supports a small industry of approximately \$1,000,000 worth of annual production.

Herring.—Investigation of the herring supply in Alaskan waters is still in progress. After the take had increased under the stimulus of World War prices, decrease in the abundance soon became evident. Restrictive measures have been applied ever since. With the exact status of the resource itself still somewhat in doubt, the herring fishery faces problems of a complex nature. The chief problem hinges on the best use of the resource, whether for reduction (to meal and oil) or for direct human consumption in form of mild-cured herring. In recent years, only about 7 to 10 percent of the herring catch has been used for immediate consumption as human food, the remainder was used for meal and oil. The issue is, therefore, one of quality versus quantity, involving also questions of the use of proper gear.

Cod.—Comparatively little is known of this resource, except that it appears to be confined to offshore banks in the vicinity of the Alaska Peninsula and the Bering Sea. The take of cod is limited because of a limited market.

Shellfish.—The known occurrence of clams, crabs, and shrimps is confined to limited areas of southeastern and south-central Alaska, where labor is available. Search made for shellfish in more remote potential areas has been limited simply because under present methods of production, factories must be close to an established community. The industry has enjoyed a moderate but steady growth, without having endangered the present supply. This is due to mild restrictions, including a reasonable limitation of the annual take. The shellfish industry is not strictly seasonal as the other fisheries are. The value of the present annual output is about \$500,000.

Whales.—No information is available on the volume of this resource. The industry, employing only one or two shore stations in Alaska, one in the Kodiak area, and the other at Akutan in the Aleutians, is at present confined to a non-Alaskan corporation, and its continuance is problematic. Operations are controlled by the International Whaling Treaty. The 1938 gross output in oil and meal was valued at \$180,000.

Fur Seal.—Within the past decade, the fur-seal herd, which uses the Pribilof Islands as breeding grounds, has doubled, and the returns from sealing operations under Federal management have steadily increased. This is sufficient proof of the sound condition of the resource. Annual sales of fur-seal skins have now reached the sizeable amount of \$1,000,000. At the present time the Territorial treasury does not share in the revenues accruing from this important resource. In fact, this

is the only natural resource for which the Territory neither spends money nor receives revenue.

Deficiencies and Problems

The present status of Alaska's aquatic resources, and of the various types of fisheries engaged in utilizing them, reveals the following deficiencies:

- (a) Lack of complete knowledge of the occurrence and volume of herring, halibut, cod, shellfish, and whales;
- (b) Unbalanced use of the entire range and variety of the fish resources;
- (c) Inadequate returns to the resident population of Alaska from fisheries largely controlled by outside interests;
- (d) Excessive migratory labor which consumes only a fraction of its earnings within the Territory;
- (e) Difficulty of reconciling maximum of use with sound conservation;
- (f) Uncertainty of the economic merits of fish traps used by the salmon canning industry.

Objectives.—Further growth of the fishing industry is not merely a matter of technical expansion or of increased conservation. Primary objectives for sound development are—

- (a) Stabilization of the salmon fishing industry at its present high level;
- (b) New uses for species that are not now marketed at all or only in limited volume.

Plans and Projects.—

- (a) Continued field research by qualified investigators, involving the construction of at least four additional salmon counting weirs;
- (b) Examination of all possibilities for new and better fishery byproducts by the Ketchikan fish laboratory;
- (c) Continued enforcement of regulations based upon sound conservation policies. This involves construction of a storehouse and shop for six speedboats in southeast Alaska.

Scenic and Recreational Resources

If one would trace on a map the actual range of scenery taken in by the mere sightseeing visitors to Alaska, who make up the bulk of Alaska's tourist traffic, it would be a surprisingly narrow strip on both sides of the steamship lines, of the Alaska Railroad, and possibly of the Richardson Highway. The number of tourists who have the means and can afford the time to see more of Alaskan scenery than the shipboard and railway car glimpses along the conventional round-trip arteries is yet small.

The problem illustrated by this statement is not so

much a problem of the tourist than a problem of Alaska. In other words, Alaska has not yet been able to develop its variegated scenic resources to a point where a maximum of scenery and other attractions can be made available to a maximum of people at a minimum of cost. The country still lacks most of the facilities for opening its real scenic beauties not only to the eye of the round-tripper but to a more direct enjoyment and use by vacationists of all sorts. The objectives of developing this inexhaustible economic asset appear to be simple and clear, but the road to their realization is studded with difficulties, problems, and conflicts.

Mount McKinley National Park is the only part of Alaskan scenery where the Federal Government has followed the policy so successfully employed in the States for the promotion of tourist travel. The Government can hardly be expected to invest speculatively in the less accessible regions of scenic interest, such as Glacier Bay and Katmai National Monument. But for the same reason, private enterprise cannot be expected to venture headlong into the virgin field of recreational development. The problem, therefore, hinges about the gradual opening of more recreational subareas with avoidance of risky investments by either Federal, Territorial or private interests. The chief beneficiaries of expanded tourist travel via the stop-over method would be those cities which by their geographical location are suited to serve as subregional centers for recreational and tourist development. Local initiative, paired with a regional viewpoint, will, therefore, be the key to such desirable progress. The Federal Government, however, must at least provide stimulus and aid to private or municipal enterprises entering this field of business by improving access to and transportation within potential tourist regions.

The attractions to the tourist and recreation seeker are not confined to scenery, nor should they be allowed to be confined to the spectacular and unusual features the Northland has to offer. Emphasis upon spectacular attractions may well be used in advertising the Territory as a tourist land, but plans for making Alaska a national vacation and recreation ground must not stop at this emphasis. Indeed, a well-developed vacation land of the future will cater to all tastes and to all sizes of pocketbook.

The Forest Service has long recognized the recreational value of the national-forest area as one of the leading resources of Alaska. It has embarked on a development program that aims at making all recreational features within the national forests accessible for the purpose of promoting the stop-over tourist business. The forest-development roads, which are tributary to the forest-highway system, are especially instrumental in developing this great vacation land.

The national-park policy is one of conservation as

well as of recreation. Conservation of forests, water storage, range, and wildlife are important objectives of the National Park Service; once established, these national reservations, incidentally, become national playgrounds.

In Alaska, the problem of recreation is likewise associated with problems of sound conservation, especially of wildlife. Plans for a better utilization of scenic resources must, therefore, be coordinated with plans for the maintenance and protection of wildlife in the Territory.

Other plans that will have to be integrated into a comprehensive recreation program include easier means of access to and of transportation within recreational areas.

Objectives.—The objectives for the development of Alaska's recreational resources may be summarized as follows:

- (a) Development of stop-over tourist facilities on a subregional—or unit—basis.
- (b) Encouragement of private enterprises through a definite government program of initial development.
- (c) Improvement of travel facilities within the Territory.
- (d) Harmonizing Territorial development with national development of recreational resources. (The type of scenery and recreational attractions offered by Alaska is a valuable supplement to those found in continental United States.)

While the realization of these objectives is necessarily a gradual process, it is obvious that final success will depend largely upon coordinated planning by all agencies concerned, particularly the Forest Service, National Park Service, Alaska Railroad, Alaska Game Commission, and all road-building agencies.

General Plans.—

- (a) A comprehensive inventory of Alaska's scenic and recreational resources consisting of field studies to be undertaken in each regional unit under active participation of all interested agencies;
- (b) Systematic expansion of the work being done by the Forest Service, namely, providing better access to the present wilderness, and promoting attractions to tourists by preserving historical sites and native lore;
- (c) Initiation of a development program for the national monument areas, especially the Glacier Bay National Monument, by the National Park Service;
- (d) Subregional cooperative land-use studies for the purpose of exploring the full possibilities of recreational use of certain areas, and for the purpose of recognizing and eliminating possible con-

licts between recreational and other economic uses;

(e) Improvement of existing legislation wherever the sound use of land for recreational purposes seems to be prevented or impaired.

Human Resources

The various plans outlined above concern the development and prudent use of natural resources only. Benefits from physical planning are not confined to those directly engaged in using Alaska's resources, but reach a large number of people, residents and nonresidents, who derive advantages of various kinds, through a myriad of channels, from this use.

While, therefore, physical planning promotes the welfare of the people of Alaska only indirectly, it is obvious that social planning, i. e., direct planning for the human resources of the Territory, is a phase of no less importance in the process of Alaskan development. In view of the administrative segregation of native and white problems—one exclusively Federal; the other Territorial, Federal, and municipal—plans and projects concerning the white population are treated apart from those concerning the natives.

The White Population

Approximately 70 percent of the Territory's annual income is spent for purposes of education, health, and public assistance. To these Territorial moneys appropriated by the Territorial legislature for the care of Alaska's white human resources must be added certain earmarked funds annually accruing to the Territory from the United States Treasury, the Forest Service, and the Alaska Game Commission.

Education.—High cost of school operation and limited, uncertain funds keep the biennial building program confined to the most necessary projects. For the same reasons, no long-range building program has been proposed by the Territorial board of education.

Health.—The Territorial department of health has submitted very definite objectives and plans:

(a) Legalization of the Territorial department of health, including provisions for a full-time commissioner.

(b) Closer cooperation between a legalized health department, the Territorial department of public welfare, and the Office of Indian Affairs, for purposes of planning more effectively health and welfare programs throughout the Territory.

(c) Construction, by the Federal Government, of a hospital to care for Alaska's tuberculosis cases, crippled children, and cases of mental disease.

(d) A number of special studies and survey projects in the fields of social medicine and public health.

Public Welfare.—Territorial administration of public welfare, which dispenses about 25 percent of Territorial appropriations, calls for more centralization and for carefully coordinated planning based upon more reliable statistics of population and living conditions than have been available in the past.

The need for a more equitable dispensation of public welfare funds calls for a comprehensive survey of the Territory's (white) human resources, particularly for a determination of standards of living and of cost of living in various parts of the Territory.

The Native Population

Somewhat less than one-half of the Territory's population of about 73,000 consists of native Indians, Aleuts, and Eskimos. They are wards of the Federal Government, and their economic and social welfare problems are the problems of the Office of Indian Affairs. In 1938, the various branches of this service were consolidated into the Alaska Indian Service under a General Superintendent, for the purpose of better coordination of its three mainfunctions which serve the educational, sanitary, and economic improvement of native life.

Mere guardianship has ceased to be the aim of the Indian Service; the ultimate objective is the establishment of a native economy based upon better use of natural resources, the development or promotion of native skill, the betterment of health, and the improvement of native attitudes. The problem, therefore, is largely one of education and training, paired with such economic support as is deemed necessary for the accomplishment of the principle objective within reasonable time.

Education.—To appraise correctly the rather large tentative school budget of the Alaska Indian Service for the next 6 years, it is necessary to consider that an Indian teacher is more than just a teacher; that he or she or both are playing a vital part in the total native program designed to lead toward an economic status that will gradually free the natives from Federal guardianship and thus gradually lessen the scope and cost of the Indian Service.

The functions of Indian teachers are manifold; they include, beside teaching, guidance in community affairs, cooperative store management, reindeer supervision, supervision of arts and crafts, homemaking, welfare work, relief work, and the operation of radio communication stations. Buildings for schools and living quarters must be adequate if these multiple functions are to be efficiently performed.

Health.—Considering the wide geographic range of Alaska's 30,000 natives, the difficulties of transportation, and, finally, the unfortunate low stage of health of the

natives, the present medical staff and equipment maintained by the Alaska Indian Service, including only eight hospitals with a total capacity of 190 beds, appears inadequate. Recent surveys revealed about 1,500 cases of tuberculosis, half of which call for hospitalization. The death rate from tuberculosis alone is over 10 times the rate for the States as a whole. Improvement of native health conditions through expansion of medical facilities is a prerequisite for the successful operation of the economic plans to be discussed in the succeeding section.

Native Economy.—With few exceptions the natives of Alaska have received in the past too much direct aid from the Federal Government and not enough stimulus and aid toward establishing an economy of their own. The problem of how native economic life can be made more independent is largely one of proper education. The practical approach to its solution is regional, because each major native region has a different natural background to which a future economy must be adjusted.

It is suggested that this can be accomplished chiefly through the following three instruments:

(a) A native reorganization program, consisting essentially of: Organization of native groups, communities as well as cooperative associations. Supplying of credit to these organizations for various purposes, but especially for industrial equipment.

(b) A native arts and crafts program. Initiated in 1937, this program provides clearing-house and marketing facilities for native products, and encourages the development of sporadic native craftsmanship into a safe industry, based upon a

more intensive use of natural resources and native skill.

(c) Reorganization of reindeer ownership and reindeer management in the Eskimo-inhabited tundra region, and in scattered other regions where reindeer husbandry can be successfully practiced.

Reindeer Economy.—While the projects mentioned under (a) and (b) have been in active operation for several years, and are satisfactorily regulated by acts of Congress, the transfer of all white-owned reindeer herds to native ownership has only recently been undertaken. Following this first step, plans are now being prepared for the purpose of securing the maintenance and proper management of the existing herds, totaling some 250,000 deer and occupying 61 ranges within an area the size of the State of California.

The welfare of 13,000 to 15,000 natives, to whom reindeer is the most vital source of food and clothing, depends upon the success of these plans, the essential features of which are—

(a) Distribution of some 82,000 deer, purchased from white owners and now Government-owned, to suitable native applicants;

(b) Training of reindeer herders through herd assistants and unit managers;

(c) Vocational education of the natives through the schools existing at each reindeer station;

(d) Supervision and improvement of the processing of marketable reindeer products;

(e) Range surveys, including: inventories of forage plants, determination of grazing capacities, fixing of range boundaries, and complete mapping of the reindeer ranges.

PART 2. PROJECT REVIEW BY FUNCTIONAL FIELDS

Introduction

Not all the plans and projects that combine to make up a comprehensive development plan bear such definite relation to a major resource that they could logically be placed under the headings of part 1. Other sets of projects serve the development of more than one resource and have to be segregated to suit their various objectives.

It therefore appears desirable now to review these plans and projects as integral parts of four functional groups, which summarily cover the most important phases of planning in Alaska. Checking existing project groups against each field has the advantage of discovering gaps and inadequacies, and of showing more emphatically the need for coordination of individual plans proposed by the various governmental agencies.

Land Use

General Land-Use Program

The fundamental approach to development planning of an area as virginal as Alaska, is through subregional land-use surveys. Alaska, much too large and diversified an area to be a regional unit, lends itself ideally to subregional division and study. In part 1 of this Alaska report suggestions for land-use surveys were confined to only two regions, the Cook Inlet area and the Tanana Valley, but the suggested itemized scope of such cooperative survey projects is applicable to any natural or economic region of Alaska.

Only in two subregions, the Matanuska Valley and the Seward Peninsula, studies approaching a land-use survey have been undertaken. While at the present time, no projects of cooperative scope are proposed, many of the study projects planned by governmental agencies must be rated as valuable preparatory work for future subregional surveys, although they may be of a less definite and detailed nature than careful subregional surveys require.

It is important that each agency engaged in resource control or development in Alaska make ample budgetary provisions for participation in future cooperative land-use studies to be sponsored and organized by a proper coordinating authority.

Land Use Within National Forests

The coastal and island regions of southeastern and south-central Alaska coincide with the national forest area. In this area, the Forest Service has established a definite land-use program, whose general objectives are threefold:

1. Classification of forest lands for the uses to which they are best adapted.
2. The building and maintenance of permanent communities, farms, homes, and industries.
3. Retention in public ownership of lands needed for public purposes such as rights-of-way for timber removal, roads and trails, water-power sites, terminal grounds, and public camping areas.

Industrial Development

This field covers all those natural resources of the Territory that serve as basic material for industrial production, in particular: Minerals, timber, fish, and wildlife resources. It is, therefore, one of the broadest and most important fields of planning. Deficiencies, as well as potentialities, of the existing industries have been pointed out in connection with their respective resources (part 1), and definite sound development policies have been advanced for each major industry.

Common to practically all industrial development in Alaska are the following adverse features:

1. Seasonal nature of most industries.
2. Dependency upon outside capital.
3. Lack of balance in the present use of resources.
4. Excess of migratory labor.
5. Handicap of distance and of excessive cost of transportation.
6. Insufficient direct returns from outside controlled industries (effect of (2) and (4) to the people of Alaska.
7. Private interest of fast exploitation versus national interest of conservation of resources.

Transportation and Communication

Alaska's vast geographic dimensions have, in the past, acted as a considerable handicap to economic penetration and are still a major obstacle to a normal rate of development.

Plans for the improvement of Alaska's transportation and communication system had no definite place in part 1 of this report, simply because they are not directly related to individual resources. Lines and means of transportation and communication are instruments of development and as such serve all resources and all industries.

Roads

Past policies in road building were largely dictated by local or subregional demands. Although this is still true today, the need for connecting the scattered sub-

regional road systems is now beginning to be felt more keenly than before.

In preparing a long-range program, the road builder is faced first with the problem of anticipating the most urgent local needs, and second, with the task of adjusting this program to whatever funds he may reasonably expect for new road projects. It is obvious that this necessity for close departmental budgeting, or planning within an uncertain budget, is a weak member in a general development plan. The two sets of road-building programs proposed by the two road construction agencies, the Alaska Road Commission for the public domain, and the Public Roads Administration for the national forests, are both calculated on uncertain, limited budgets, and are therefore, tentative. Their soundness is, however, warranted by many years of experience in planning and building.

The office of the Territorial highway engineer, which is not strictly a construction agency but cooperates with the Alaska Road Commission by apportioning Territorial funds to the latter's program, has contributed a plan which is herewith presented in original under the appropriate title:

A TRUNK ROAD SYSTEM FOR ALASKA

(By Wm. A. Hesse, Territorial Highway Engineer)

The needs for roads within the Territory are so great and so widespread and road building activities in the past have been so difficult that any approach to the question henceforth should be based upon some definite plan.

Whether the plan should contemplate a completed program within 6 years or within any other period is not a matter of great importance but the question of facing each season with no assurance that any roads at all can be built or even the existing roads properly maintained is highly important.

Road work in Alaska is naturally seasonal and since the maximum length of the season for field operations is 6 months, it follows that in order to perform such work advantageously to the full extent of the season, the necessary equipment and supplies must be in readiness on the ground at the beginning and not in the process of ordering from Seattle after the season has already begun. Planning to this extent at least is essential.

Rather than to cover the whole field of roads within the Territory consisting as it does of numerous disconnected and widely separated projects this office feels that to concentrate upon a single trunk road piercing the Territory from the beautiful sheltered inland waters of the southeastern coast and linking the existing major highways with this project and with one another would perhaps serve a more generally useful purpose and give the sightseeing visitors an opportunity to make the most spectacular journey anywhere to be found at their own convenience and with the utmost comfort.

It would enable the traveler to take his car aboard the steamer in Seattle, pass through a thousand miles of incomparable inland waterways, disembark at Haines and drive his own car over more than a thousand miles of Alaskan highways that would afford a complete cross section of Alaska, its majestic mountains, its glaciers, and its industries. The inland waters not only afford an ocean voyage as calm as a millpond but afford restful diversion from long auto trips and these waters can be seen no other way.

The proposed Alaska highway would traverse a region, the scenic grandeur of which is unsurpassed anywhere though it would be necessary to construct about 260 miles through Canadian territory, and it is believed that if in consideration of concessions made to Canada in the matter of extending to it free port facilities at Skagway, Canada would likewise extend similar privileges to the United States for the purpose of building this road, such an arrangement would be mutually beneficial.

The proposed highway would leave tidewater at Haines, Alaska, where the United States Army Chilkoot Barracks is situated, and would follow the existing Haines-Pleasant Camp road for a distance of 24 miles and thence by new construction ascending the Chilkat Valley to the Canadian border which is 40 miles from Haines. The highway would then pass through Canadian territory by way of the Dezadeash and Kluane Lakes passing a galaxy of mountain peaks ranging to 19,850 feet in elevation and of surpassing scenic beauty; thence across the Donjek and White Rivers to the Canadian-Alaskan border, a distance of 260 miles. From this point there would be 90 miles of construction to connect it with the Richardson and Steese highway system. This would constitute the first link of the project.

The second link of the project would leave the Richardson Highway at a point near Copper Center 108 miles from Valdez and 263 miles from Fairbanks and 25 miles from the junction of the Haines link with the Richardson Highway and would run westerly a distance of 135 miles to Palmer in the Matanuska Valley, thus connecting Anchorage and the Matanuska Valley with this same trunk system and giving the Matanuska farmer a larger potential market than he now enjoys.

The writer is reluctant to consider Alaska road development purely in the light of defense measures though it can be seen at a glance at the accompanying map that the Army air bases at Anchorage and Fairbanks are at once connected with one another and with the Army post at Chilkoot Barracks, that the interior air bases would be served independently of the Alaska Railroad by a route that uniquely passes behind the great coastal mountain barrier and stays behind it, and that it traverses an area of the least annual snow fall with the possible exception of the first 24 miles out of Haines.

Apart from any consideration of highway development this project would afford the opportunity for the construction of sorely needed aviation fields and which may only be built after other is a highway over which to transport the necessary mechanical equipment.

While this trunk road would provide a direct overland connection with all of the existing Army activities in Alaska, it is significant that the tidewater terminal at Haines is but 160 miles in an air line from the naval airbase at Sitka.

Work on the project could be advantageously undertaken with four major construction camps operating simultaneously. No insuperable or even difficult problems are to be expected and while surveys have not yet been made a foot traverse of the entire project has been made and a tentative estimate would indicate that there would be 501 miles of new construction involving an expenditure of about \$5,000,000.

This proposed trunk road system would, besides providing connection between Haines and Nabesna and between Copper Center and Palmer (first priority roads), also connect the Richardson Highway with the Mount McKinley National Park on the west, and with Eagle and Jack Wade on the east. It further proposes to connect Anchorage and Homer with the Seward Road system and to extend the Chitina Road to

McCarthy. The entire mileage of these proposed roads is:

	Miles
First priority roads.....	477
Second priority roads.....	476
Altogether.....	953

The construction costs of these roads are estimated at \$12,000,000 or at \$2,000,000 per year on a 6-year schedule. The significance of such a road system cannot be overestimated as it will serve three major purposes, namely, (a) defense, (b) tourist trade, and (c) mining development. Reference is made to supplementary notations under these heads.

The Alaska Railroad

The Government-operated Alaska Railroad has a strictly pioneering function, namely to provide access from the coast to the interior, and thus to contribute to the industrial development of that vast area. Incidentally, the road has also become instrumental in opening some of the most scenic parts of the interior to an ever-growing tourist traffic. Serving as a means to an end, the Alaska Railroad should not be expected to yield business returns, and its now moderate deficits may be looked upon as a justifiable contribution to Alaskan development.

This attitude should also govern any future plans for the improvement of its service, replacement of equipment, and all necessary construction projects, especially since the road will, no doubt, assume an additional function, namely, to serve as an important link in Alaska's defense line.

Airways³

It is an obvious truth that while Alaska may not be ideally suited for aviation, aviation is ideally adaptable to Alaska's needs. Savings in time more than balance the yet high cost of flying. Although airways will not replace highways, their advantage over a fixed highway system, namely flexibility and speed, is too evident to need further support. The problem is not one of replacement, but rather of supplementation and coordination. Landing fields without surface road connection would be of little value.

The benefits from increased and improved aviation facilities spread over all phases of development, and may conveniently be grouped as follows:

- (a) Carrying of freight, passengers, and mail.
- (b) Providing access to otherwise inaccessible regions.

³ Due to the early stage of Alaska's defense program, it is not possible to present at this time a comprehensive plan for the future development of a desirable system of airways and landing fields. Future aviation facilities will serve military and economic purposes, and planning will have to be done in conjunction with military authorities.

(c) Facilitating health service, law enforcement, game protection, and fire control.

(d) Expediting mapping and prospecting.

(e) Serving national defense.

These potential benefits are sufficient justification for all plans and projects listed hereunder or appended in tabulated form, which may be considered as an approach to an Alaska aviation program. A perfect program, not available at this time, would have to include the military plans being worked out by the Army and Navy for defense purposes.

Communication

The complex network of communication facilities, which spreads over the vast expanse of the Territory, serves a large number of purposes—governmental, industrial, military, and private. It also includes the communication system for commercial aviation and weather reporting, plans for which were outlined in preceding sections. The backbone of communication is the Alaska Communication System, operated by the Signal Corps, United States Army. Jurisdiction over the technical phase of operation is vested in the Federal Communications Commission. Both Federal agencies have submitted plans and proposals that involve construction projects.

Steamship Transportation

Oversea Transportation.—Plans for the development of Alaska, as reflected in the numerous objectives presented in this report, must include the question of adequate water transportation as a vital feature.

Even under the most optimistic assumptions, Alaska will always be dependent upon the import of 90 percent of its necessities from continental United States, and the volume of exports can also reasonably be expected to increase in years to come. Seasonal commuting of residents and nonresidents and a growing stream of tourists make improvements in water transportation imperative. Speedier service, better schedules, and modernization of steamer accommodations are a crying need at this very time, and will be more so in the near future. No plans have been advanced for such improvement, and the only present policy is one of laissez-faire. As has been suggested by the Alaska Resources Committee⁴ in 1937, the United States Maritime Commission may well include in its studies of the American merchant marine a critical survey of the service to Alaska.

Local Water Transportation—Star Routes.—The need for a more adequate and more efficient coastal and star-route service to connect and serve the far-spread

⁴ National Resources Committee, Regional Planning, pt. VII (Alaska), pp. 25 and 63.

shore and island population of Alaska is apparent. This is an important phase of subregional development, and plans for it should be included in the suggested land-use surveys and also in the study of recreation by regional units.

Recreation and Tourist Trade

A most significant project for the development of tourist trade is embodied in the trunk-road system for Alaska, outlined in the preceding chapter on transportation. A completed trunk-road system will act as a tremendous incentive to automobile travel. Besides, the proposed connecting roads will open hitherto untapped resources of most fascinating scenery, vying in uniqueness with anything the continental United States has to offer.

In lieu of a yet lacking comprehensive program, the following summary of preliminary work considered essential for the promotion of recreational and tourist development is offered:

(a) Initiation of development work in Glacier Bay National Monument by the National Park Service.

(b) Expansion of development work within the national forests for the purpose of stimulating stop-over tourist trade.

(c) Exploration of recreational needs and possibilities as part of subregional land-use surveys.

(d) Reconciliation of wildlife protection (refuges) with recreational development.

(e) Careful determination of the recreational values to be expected from the suggested trunk-road system for Alaska.

(f) Improvement of steamship connection between continental United States and Alaska.

(g) Encouragement of star-route service in the coastal recreational areas.

(h) Encouragement of private initiative in the establishment of better tourist accommodations, in the form of privately operated tourist lodges in the more accessible areas of scenic interest.

(i) Effective advertising campaign by Federal and Territorial Governments and by communities and private interests.

PART 3. TERRITORIAL CONTRIBUTIONS TO ECONOMIC DEVELOPMENT

The Territorial Government as A Development Agency

Compared with the role played by the Federal Government in development planning, the present role of the Territorial government as a development agency appears very modest. Its limitations are fundamental, namely an effect of the Territorial status, of the smallness of the population, and of the limited, uncertain funds available. Approximately 15-20 percent of the annual appropriations are spent for physical development purposes:

For Transportation and Communication

Substantial contributions to the road-building program of the Alaska Road Commission, and maintenance of shelter cabins and telephone lines.

For Development of Mining

Maintenance of three assay offices; field work by Territorial department of mines; and extension of service conducted by University of Alaska.

For Conservation of Wildlife

Bounties on wolves, coyotes, and eagles. Operation of fur experiment station by University of Alaska.

For Conservation of Aquatic Resources and Development of Fisheries

Bounties on hair seals. Clearing of salmon streams. Cooperation in Ketchikan Fishery Laboratory.

For Development of Agriculture

Operation of agricultural experiment stations by University of Alaska.

For General Development (Economic and Social)

Through research and studies undertaken by the Alaska Planning Council, and through participation in cooperative Federal surveys.

Most of the remainder of the Territorial income is spent for purposes of social development, namely for education, public health, and public welfare. This uneven ratio of expenditures for physical development to those for social development does, however, not imply a lack of balance in Territorial planning. It may reasonably be assumed that the Territorial legislature appropriates the available funds for whatever purposes will best serve the interests of the electorate.

The Territory's educational needs include rather large items for the construction, maintenance, and improvement of school buildings, including isolated rural schools as well as city schools and the University of Alaska. The building program submitted by the commissioner of education for the next 6 years involves anticipated expenditures of some \$800,000, or approximately \$133,000 per annum. The 6-year building program of the university likewise involves sizable annual expenditures.

Aims of Municipal Development

Speaking in terms of development, Alaskan communities are in the process of emerging from the pioneer stage. But they are emerging at an increasingly fast rate, chiefly as an effect of subregional industrial development. The determining factor in their steady rise from frontier beginnings has been regional, i. e., towns either prospered or became stagnant as did the dominant regional industries.

In the light of this dependency, being effects rather than causes, communities cannot be expected to make such direct contributions to resource development as do Federal or Territorial agencies. They contribute, however, indirectly by providing service facilities to the industries that use the regional resources, and social facilities to the service population, of which they largely consist. Viewed in the light of a general development plan, the situation calls not only for more purposeful city planning but for an extension of city planning over the subregions upon which the cities economically depend.

In general, it can be maintained that the much desired growth of population must necessarily take its start from the existing nuclei, the communities. Isolated developments are doomed to failure and, therefore, weak members in the Territorial economy. Initiative must reach out from the cities into the untouched subregions to tap hitherto undeveloped resources of scenery, hunting grounds, mineral springs, farmlands, or other potential objects and places of development. Another aim of city-planning bodies would be the exploration of all possibilities for the establishment of such minor industries as will offset the handicap of seasonal employment under which all Alaskan communities suffer.

PART 4. MILITARY DEVELOPMENT AS A STIMULUS TO ECONOMIC DEVELOPMENT

Introduction

Original plans for the establishment of military bases in the Territory date back several years. Construction of Navy bases had actually started before the European conflict assumed its present menacing aspects. Recently, however, the original scope of construction work was considerably expanded and its execution accelerated by ample appropriations following the passing of the national-defense bill. The speed with which Alaska's military bases are now being pushed has not allowed sufficient time to study in detail the potential effects of these developments upon the Territory's economic future, or to plan for the necessary adjustments that the affected localities and subregions will have to make.

The present, short-lived period of construction, with its boom of employment and soaring cost of living, will soon be followed by a period of normal adjustment, and emergency planning will give space to long-range planning. Necessarily, the lack of detailed information on the plans under preparation by the Army and Navy precludes at this time a definite analysis of the mutual needs and benefits that this sudden superposition of military developments upon a youthful economic background will cause. Only the principles can here be stated, to serve as a preamble to future planning.

Mutuality of Interests

In general, military interests and economic interests are diverging. In the case of Alaska, both developments are, however, taking place in an underdeveloped region, and the satisfaction of certain military needs is bound to fulfill at the same time certain economic aims, and vice versa.

This mutuality of objectives and interests is best illustrated by looking at the same set of objectives from two angles.

The Military Point of View (Defense Needs)

From the military viewpoint the following major objectives are necessary or desirable:

1. A broad economic development of strategic subregions, i. e., economic key regions in which military bases are being established. Such development includes—

- (a) Production of foodstuff;
- (b) Exploration and production of strategic mineral commodities;

- (c) Facilities for processing certain basic products;
- (d) Increase of population.

2. Thorough survey, by aerial and ground mapping, of those uncharted sections of Alaska that are of military importance.

3. Establishment of a perfect network of landing fields, communication stations, and weather-reporting stations.

4. Completion of a strategic network of ground-transportation lines, including improvement of the Alaska Railroad.

5. Establishment of minor manufacturing industries designed to supplement the military plant.

6. Increase and improvement of local service facilities for the accommodation and social convenience of the troops to which Alaska is host.

The Non-Military (Economic) Point of View

It is obvious that the realization of the defense needs listed under 1, above, will greatly stimulate the general economic development of the Territory, but especially of its strategic subregions. These potential benefits may be enumerated as follows:

1. (a) Greater market for local food products, especially potatoes, vegetables, hay, dairy products, and meat (including reindeer).

(b) Increased mining activity, through greater demand for hitherto less used minerals, including coal and oil.

(c) Possible processing plants and basic Alaska products, especially local timber (wood treating plants) and ores (smelters).

(d) Influx of population, when controlled, will lead to sound settlement within restricted areas.

2. Mapping for military purposes will benefit all civil objectives of development, especially mining, road building, soil surveys, and land-use surveys.

3. Airfield development with concomitant improvement of communication service, when undertaken with a view to civil needs, will aid all types of economic development.

4. A completed ground-transportation system will aid especially the mining and tourist industries, and will open new markets for agricultural products.

5. Minor manufacturing industries are especially

needed for taking up the slack of seasonal employment. Examples are canneries, minor wood-using industries, tanneries, etc.

6. Increase of service facilities will also provide more off-season employment and improve the living standards of the civil population.

It is only logical to assume that this potential chain of developments will pour new blood, new stimulus, and a new spirit of enterprise into the economic life of Alaska. The vicious circle of Alaskan economy was waiting to be broken by developments such as national defense requires.

PART III. FUNCTIONAL DEVELOPMENT POLICIES



DEVELOPMENT OF RESOURCES AND STABILIZATION OF EMPLOYMENT
IN THE UNITED STATES
PART III: FUNCTIONAL DEVELOPMENT POLICIES

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FOREWORD

For the further development of a program of public works which will provide most effectively for the full utilization of resources and a higher standard of living in all parts of the country, it is necessary to appraise individual projects from various standpoints. They must be looked at from the point of view of their effect upon employment, the ways in which they may stimulate and aid private enterprise, their possibilities and desirability from the point of view of regional interests and their conformity with long-range policies for functional efficiency, use, and development of land, water, energy, transportation, etc.

This Part III of the report by the National Resources Planning Board on The Development of Resources and Stabilization of Employment in the United States is concerned with statements on frameworks of policy in the functional fields on which committees of the Board have been working for some years. Later, it is proposed in other reports to supplement these statements with other documents of similar intent on long-range work and relief policies, transportation policies, and housing. Each of the statements in this part of the report is the work of the members of the technical committees in the indicated field. The views of the Members of the National Resources Planning Board on these problems are summarized in Section E, Part I, of the report.

Public Works and Land Use Adjustment

The Land Committee of the Board has been concerned during the past 2 years with the study of some of the special problems involving land and with putting together background materials as the basis for formulation of policy statements.

The report on Land Acquisition in Rural and Urban Areas provides a general basis for appraisal of the timeliness and value of proposals for public acquisition of various types of land as an aid to making land more useful and productive. A study of Tax Delinquency has been undertaken to attack the problem of "No Man's" land where neither private owners nor public bodies assume responsibility for the proper maintenance of land resources. A major report on Land Classification and procedures for determination of the available uses of land has been completed. It will serve as a measure for the evaluation of future proposed survey, mapping, and classification activities.

In connection with the work of the Board under the Federal Employment Stabilization Act of 1931 the Land Committee has recently concentrated its attention on proposed planning procedures for application in

local, State or regional areas which are intended to produce an analysis of the problems which those areas face and possible lines of solution. It has also established a Subcommittee to prepare a general policy statement on Public Works and Land Use Adjustment. The Chairman of the Subcommittee, Dr. Carl Alsberg of the Giannini Foundation, developed suggestions for this statement of policy, but unfortunately, died before completion of the report.

National Water Policy

Since the National Resources Board was organized in 1934 and absorbed the former Mississippi Valley Committee to prepare plans for the use and control of water in all parts of the country, the Water Resources Committee has been engaged in the preparation of reports and plans on all aspects of water utilization. Through membership on the committee of key personnel from all of the Federal agencies concerned with water problems and with the aid of specialists from outside of the Government, the committee has made a number of important contributions to the development of plans and public understanding of water problems. Their emphasis on multiple purpose developments and on treatment of drainage basins as single units for planning has had a large effect on the planning and construction activities of all of the agencies concerned.

The statement on National Water Policy which is presented herewith summarizes and repeats many of the major recommendations which have previously appeared in other reports of the Board and its predecessors, in the preparation of which the Water Resources Committee played an important part.

Energy Resources and National Policy

Two years ago the President transmitted to the Congress a report of this title, prepared by the Energy Resources Committee of the Board. Since that report was transmitted the committee has continued its work with special relation to emergency problems in the use of energy resources. The statement submitted herewith summarizes the key points in the earlier document and adds numerous other items from materials developed since the issuance of the previous report.

All three of the statements submitted in this volume emphasize the continuing nature of the problem of building national policies for the best use of resources. Policies for the use of one resource cannot be adequately considered without reference to corresponding policies for many other resources. Funds, personnel, and energies of the Board will not permit attacking all

problems at once, and it has therefore been a process of gradual growth and accumulation to build up and fit together the various parts of the picture. In future years it is the hope of the Board that additional statements of this character can be added to the three sub-

mitted in this report and that these statements can be revised and brought up to date from year to year to show more adequately the relationship among all our resource policies for the development of the Nation's resources and the stabilization of employment.

LAND DEVELOPMENT POLICIES

INTRODUCTION

The statement on the following pages, developed under the direction of Dr. Carl L. Alsberg, the original chairman of the Evaluation Subcommittee of the Land Committee, was brought to completion after his death under the direction of Mr. Julius T. Wendzel in accordance with suggestions from the members of the Land Committee. The subcommittee responsible for the report consisted of: William I. Myers, M. S. Eisenhower, and Lee Muck.

In this work, Leonard Unger and Victor Roterus, members of the staff, participated.

The principles set forth furnish a useful background for determining future functional and regional needs in the field of public works, for defense programs, and for the evaluation of individual public works projects affecting land use.

The members of the Land Committee include:

William I. Myers, *Chairman*, Head, Department of Agricultural Economics and Farm Management, College of Agriculture, Cornell University.

Oscar Chapman, Assistant Secretary, Department of the Interior.

Carl L. Alsberg, Giannini Foundation, University of California.

Charles C. Colby, University of Chicago.

Philip H. Cornick, Institute of Public Administration.

M. S. Eisenhower, Land Use Coordinator, Department of Agriculture.

Charles A. Lory, President, Colorado State College of Agriculture and Mechanical Arts.

Lee Muck, Director of Forestry, Department of the Interior.

H. R. Tolley, Chief, Bureau of Agricultural Economics, Department of Agriculture.

George S. Wehrwein, University of Wisconsin.

M. L. Wilson, Director of Extension Work, Department of Agriculture.

J. D. Wolfsohn, Assistant to the Commissioner, General Land Office, Department of the Interior.

Gilbert F. White, *Secretary*.



LAND DEVELOPMENT POLICIES

Land-Use Objectives and Public Works

The Land Committee has previously suggested that the central aim of a national land-use policy should be to enable man to derive from the land the maximum employment, benefit, and satisfaction consistent with the permanent maintenance of that resource.¹ All public works that directly or indirectly affect land use should contribute to the achievement of this objective. Moreover, all public works in this field should harmonize with the far-reaching Federal, State, and local programs, in fields other than public works that now encourage desirable physical, economic, social, and institutional adjustments essential to permanent land use.

Three Land-Use Aspects of Public Works

From the standpoint of land use, a public works program has three principal aspects: (1) The general economic aspect of the public works program as a whole, (2) the aspect of public works which affect land use indirectly, and (3) the aspect of public works which are primarily land-use adjustment measures.

General Influence of Public Works on Land Use.—A soundly conceived public works program is an essential part of the total public activities and expenditures that are desired to stimulate a high level of employment and economic activity. This general phase of the problem is important to those concerned with land use because the ultimate success of both public and private land-use activities is intimately related to the success of the economy as a whole. The top limit of employment, benefit, and satisfaction of the people on the land is largely prescribed by the condition of the entire economy. All helpful aids to the entire economy open possibilities in the land-use field, and ill-considered activity in the entire economy threatens possibilities in the land-use field.

Additionally, many of the forces, circumstances, and policies that lead to land abuse or that require land-use adjustment, are the same as those that cause general economic difficulties. A significant change in the foreign market situation, for example, may cause industrial unemployment and lower farm prices; may induce the unemployed to settle on new, probably inferior lands; and may compel existing farmers to neglect their lands because they cannot quickly find a profitable system of farming to substitute for the system they had. The cycle of difficulty may include reduced buying power in rural areas, fewer urban sales, and increased

unemployment. Consequently, those who are primarily interested in wise land use must be concerned with all types of public activity that cope with the fundamental forces, circumstances, and policies inherent in general economic dislocations. As will be pointed out in section III of this report, the present world situation is likely to yield permanent changes that will require many types and degrees of fundamental readjustments in our internal economy and in land use.

The principles that should govern the Land Committee's recommendations with respect to public works, therefore, should be sufficiently broad to permit consistency and unity in the total public activity, whether directly or only indirectly affecting land use, and at the same time must be directed especially at helping effectuate the land-use adjustments immediately needed.

Public Works Closely Related to the Land-Use Field.—

In addition to its general interest in the public works program as a whole, the Land Committee believes that it should give specific attention to a large volume of public works which are not always considered to be in the land-use field but which have a significant effect upon land-use activities and upon the people who live on the land. Flood control, public roads, and hydroelectric power developments may be planned primarily for their self-evident purposes, but each project may have beneficial or harmful effects on the land. A flood control reservoir, for example, may inundate occupied farm land, and unless the appropriate public action is taken to prevent it, the people who are thus compelled to move may find that the price of the privately owned land below the reservoir, protected for the first time at public expense, has increased to a level beyond their ability to pay. Or a rural highway may encourage settlement on inferior lands, while good lands remain inaccessible. Therefore, public works of this category should be planned and undertaken not only in terms of their own major objectives, but also in relation to the general framework of land-use programs.

Public Works in the Land-Use Field.—Another group of activities, such as soil conservation, run-off retardation, forest protection and development, provision of recreational facilities, water facilities, and irrigation are recognized as important parts of a general land-use program. However, they are not always considered to be "public works." If the nature of public works and their relation to resource development and employment stabilization, as analyzed by the Committee in the following section, is accepted, these activities must either be considered as public works or to be very similar to public works in many aspects. Plans and programs in these fields of endeavor should be evaluated

¹ National Resources Planning Board, *Public Land Acquisition, Part I—Rural Lands*, June 1940.

primarily as integral parts of the Federal, State, and local programs for land-use conservation, development, and adjustment.

Concepts of Public Works

The present lack of adequate criteria for developing public works programs is partly due to the fact that the term "public works" does not have a commonly accepted meaning. The term "public works" is used in a wide variety of ways. At one end of the scale, giving great weight to historical development and long-established practice, there is a definition which limits the term to "construction works" on publicly-owned land, such as lighthouses, post offices, and highways. At the other end of the scale, there is a concept arising out of general economic and fiscal analysis which would include almost all types of Government expenditures. The Land Committee is inclined toward a concept midway between these two extremes, which gives recognition both to the tangible and the physical aspects implicit in the term and to the economic distinction between this and other types of Government expenditures.

An exact definition of public works is perhaps less important than a recognition of the part that public works, however defined, play in the broader framework of governmental programs and expenditures. A rough delimitation of the realm that the term "public works" is to cover is, however, necessary as a basis for the development of principles that may be used in evaluating and programming public works affecting land use. Accordingly, the Land Committee offers a definition that would be useful, perhaps not generally, but certainly as a working concept for considering public activities affecting land use.

One Common Denominator in Varying Definitions.—One element in all concepts of public works is the provision of funds by a governmental agency, either as an advance of capital or as a direct expenditure. The provision of funds by a governmental agency is in a sense a common denominator of public works. It follows, then, that in determining the desirability of given public works activities everyone, no matter what his definition, seeks to determine the desirability of advancing governmental funds for the suggested activities.

Public Ownership Not Essential.—The varying concepts of public works involve two or three other considerations which call for tentative suggestions by the Land Committee. Public works need not be confined to lands or to structures which are publicly owned. A public interest in the benefits is the basic consideration. It is clearly true that the public generally has a very great interest in how all the Nation's lands are used; it therefore seems unwarranted to say, as some do, that public land-use activities should be withheld from private lands,

even though the public benefits exceed the public costs. The guiding consideration should be not the type of ownership, but the extent to which benefits from public activities on any lands, including private lands, accrue to the general welfare. More specifically, if conservation works on private lands were needed to protect a public water supply, and if the benefits exceeded the cost, then the public works on private lands would be justified. A practicable definition of public works must recognize this.

The Emergency Relief Act of 1939 recognizes the social interest in conservation activities on private lands. Public 46, authorizing Federal assistance for erosion control, the basic legislation for the Civilian Conservation Corps of 1933, the Water Facilities Act of 1937, and the Flood Control Act of 1936 as amended do likewise. The principle should be still more generally recognized and more broadly applied.

Construction in Public Works.—The other important concept in the term "public works" lies in the term "works." The implication is that something tangible and physical and of more than momentary significance is involved. This is not only common sense but of great economic and social importance. "Works" are facilities that will provide a continuing flow of benefits, products, or services over a period of time.

A public work is a real addition to the wealth or productive capacity of the Nation, whether it be a hospital, an irrigation dam, a reforested area, or a farm laid out in a manner which assures soil conservation. There is a real difference between public expenditures for this type of activity and expenditures that involve mere money payments to individuals, such as direct relief grants and social security payments.

Both types of expenditures provide needed current income directly to the individuals and result in a current stimulation of the whole economy.

If resource development and the provision of employment are the key factors in the provision of public works as an economic and social measure, in the opinion of the Land Committee the term cannot be limited to buildings, dams, roads, and other products of the construction industry, but must also include such activities as forest planting and improvement, land development by drainage and clearing as well as by irrigation, run-off retardation and erosion prevention as well as flood control by dams and levees, and contour furrowing and terracing, and other measures for the development and conservation of land resources.

For example, a masonry dam, an earthen terrace made with special equipment, and a strip crop or contour furrow installed with ordinary farm machinery may have identical purposes and all may involve public assistance, but public construction may be involved only in the first of these three. Again, such develop-

mental and conservational activities as forest planting, fire protection, land clearing, drainage, fencing, etc., while requiring public assistance and contributing directly to the upbuilding and maintenance of land resources, may involve little public construction activity.

Construction activity of the heavy industry type undoubtedly has special merit in counteracting certain short-run forces of business depression and unemployment. But its contribution to the alleviation of long-run pressures toward under-employment and under-utilization of resources is not significantly different from nonconstruction activities.

The Land Committee suggests, therefore (1) that the term "public works" should be broader than "construction activities" and should be less broad than "Government expenditures;" (2) that ownership of the site or structure should not be a necessary characteristic of public works, but that (3) whether the sites or structures involved are privately or publicly owned, the agency providing the funds must be able to assure that their use will provide net benefits in the public interest.

Public Works in the National Economy

Although development of resources and land-use adjustment must be considered in the light of conditions of the entire economy, it is not the function of this Committee to suggest in any detail the principles to be followed in connection with a general public works program. It is, however, necessary for the Committee to indicate in a general way its understanding of the objectives of public works activities in order to discuss the role of public works in the field of land use.

Short-Run Unemployment.—Public works as an employment stabilization device were for some time considered primarily as a means of offsetting cyclical swings in economic activity. Some thought simply in terms of varying direct employment in governmental works activities. Many more felt that if public works activities were to have significant effects in offsetting extreme swings in employment, it would have to be through their stimulating effects on the private economy. Whichever view was held, however, planning for public works was carried forward on the theory that a reservoir of projects should be prepared primarily for use in times of short-run, periodic unemployment. This point of view was one of the important considerations in the passage of the Employment Stabilization Act of 1931.

Long-Time Unemployment.—The long-continued, extensive unemployment of the thirties emphasized that unemployment was not entirely due to short-run causes. Public works then began to be stressed as a possible means of alleviating unemployment of a more chronic character. It was, of course, recognized again

that public works must depend for major effectiveness upon stimulating the whole economy rather than upon direct employment in governmentally managed activities. Thus, public works objectives came to include long-run as well as short-run stabilization of employment. The achievement of permanently full employment with a minimum of cyclical fluctuations became the goal.

A high and sustained level of employment requires the orderly development and utilization of resources in order to make the maximum contribution to economic welfare. In fact, only such conservation and development of all resources as will give a net gain in productive capacity to the Nation can make possible the economic growth necessary to assure optimum employment and a rising plane of living. Rural China and India have attained the "ideal" of full employment, but it is a barren goal in the absence of a resource base adequate for the needs of the people dependent upon it.

The Land Committee, accordingly, assumes the objective of public works generally to be this: To contribute to optimum employment and a rising plane of living, with a minimum of short-run fluctuations, through stimulating production and the wise development and use of resources. It is, of course, recognized that public works activities must move toward these objectives through a variety of channels and in coordination with other general economic and fiscal policies.

Public works expenditures are viewed as part of a larger program of public expenditures and activities designed to influence employment, production, and resource-use through influencing investment and purchasing power. In considering individual types of public works or individual projects affecting land use, the Land Committee must obviously be guided by the general policy and situation with respect to the broader program of expenditures which will have been determined for the government as a whole. The rate of expenditures on public works affecting land use must, of course, be in reasonable harmony with the rate of expenditures on all public works and on all activities designed for similar purposes. Furthermore, Federal expenditures for public works and similar activities are considered as only one of several possibilities for counteracting the various forces that make for under-employment and limited resource use and development. Taxation policies, business policies, and common understanding among interest groups in the economy may be equally significant. It is, however, assumed that activities in related fields, especially taxation, will be harmonious with that for expenditures.

A high degree of coordination between the expenditures of the Federal Government and those of the States and local jurisdictions must be achieved if a

public works program is to attain maximum effectiveness. Before the depression, the expenditures of the States and their subdivisions for public works, especially for streets, roads, and schoolhouses, were several times those of the Federal Government. More recently, much of the Federal expenditure for public works has merely replaced that of State and local jurisdictions. Since it is the total volume of governmental funds that is of primary significance in influencing the private economy, the need for coordination of Federal with State and local public works activities and expenditures is evident.

Finally, whether considering all public works in relation to the total economy or certain public works in relation to land use, the Land Committee believes that generally public works and expenditures must make their major contribution by stimulating the development of the private economy. Public works are considered as part of a broad framework of governmental programs which in themselves cannot provide the necessary volume of employment and income but which, by aiding and stimulating all types of activity, do offer one means of strengthening the economy as a whole. It is a basic corollary that public works and expenditures should be so carried out as not to impair the vitality of private enterprise essential to the functioning of the economy as a whole.

The Programming of Public Works Affecting Land Use

The programming of public works involves the concrete task of evaluating specific projects and suggesting priorities for such projects on the basis of their general merit and the time at which they should be undertaken. There will always be more public works proposed than can be financed even if all are of high merit and suitable for public undertakings. However, many among the total proposed will be undesirable for one or more reasons, and these must be sifted out before a residual of desirable activities can be listed in a six-year program. In other words, the programming of public works consists of an appraisal of specific projects as a basis for determining whether or not public funds should be provided for them and the order in which desirable projects should be undertaken.

A wide variety of factors must be considered in judgments concerning the relative desirability and the degree of urgency of specific public works proposals that affect land use.

First of all, the general objective of public works and of land use activities must be kept in mind. If carried out, would the project aid in enabling "man to derive from the land maximum employment, benefit, and satisfaction consistent with the permanent maintenance of land resources?" Does the project perform

a desired public works function by increasing economic activities, promoting employment stabilization and improving the utilization of resources?

In addition to these very general considerations, each specific proposal must be considered from the following particular aspects before a recommendation can be made as to its significance and place in a 6-year public works program:

- (1) Costs as compared to benefits;
- (2) Methods of financing;
- (3) Relation to regional and functional plans and programs;
- (4) Timing.

Evaluation of Costs and Benefits

Evaluation of costs and benefits is basic to any sound programming of public works. No public work can be considered acceptable unless the total benefits, to whomsoever they may accrue, exceed the total cost. Furthermore, there may be many more works which meet this criterion than available funds will finance. This requires a selection on the basis of those projects with the most favorable ratio of benefits to cost. In this selective process, social as well as financial costs and benefits should be taken into account.

Techniques of Measuring Costs and Benefits.—The monetary appraisal of some types of benefits, such as the prevention of flood damages, has long been based upon rather detailed techniques and formulas. In other fields, the difficulties of measuring widespread and rather intangible benefits have discouraged the development of techniques for comparing monetary costs with nonmonetary benefits, and therefore projects have been appraised in terms of rather general considerations. In order to permit direct comparison of all types of public works and to give sufficient weight to this most fundamental criterion of evaluation, it is very important to develop as far as possible common methods of measuring costs and benefits for all types of public works.

The difficulty in this undertaking lies in the measurement of benefits which can neither be sold nor definitely be traced to specific individuals or to limited areas. For example, the recreational value of forests, parks, or reservoirs is very real, but thus far has defied attempts at measurement. The benefits of soil conservation activities in limited areas have been measured in terms of the present dollar value of increased productivity or the arresting of declining productivity; but from another point of view, the soil resources of the Nation are priceless.

Particularly in the land-use field, social benefits must be given great weight although they cannot be readily expressed in dollars and cents. For example:

- (1) Large social benefits accrue from the installa-

tion, partly at public expense, of water-flow retardation and erosion prevention programs on certain watersheds. In the improvement program on the Los Angeles River watershed, the benefits to the land which the program is carried out are appreciable, though less than the benefits to the entire city of Los Angeles through reduction in the flood hazard originating on these lands.

(2) Under the Wheeler-Case and the Water Facilities programs, the projects may not entirely pay for themselves, but large social benefits arise in avoiding both rural and urban unemployment and in establishing a permanent resource base for many families. The public expense so involved is no greater than the direct relief that would otherwise be necessary, and a continuing benefit is achieved, as compared to the temporary benefit of direct relief.

(3) The acquisition and rehabilitation of submarginal lands, which are a source of rural poverty and tax delinquency, bring large and enduring social benefits. Although the lands so purchased may never pay for themselves in a commercial sense, their purchase makes possible needed basic adjustments for farmers over the whole area involved, and may contribute to a reduction in relief and other governmental costs. The result of the adjustment is an increased stability for the area as a whole. Likewise, public acquisition of key tracts of timber in the Pacific Northwest, for the purpose of insuring its orderly utilization and the stability of forest industries, would yield social benefits through keeping alive and prosperous communities that otherwise will inevitably become ghost towns, and through making possible continuous instead of intermittent operation of the northwestern timber industries.

(4) In the Lakes States cut-over areas, public assistance is necessary to provide families on inadequate acreages with a reasonable resource base; otherwise these families must continue to be dependent upon relief. In this case, a public expenditure will return higher social dividends by enabling the families to make land-use adjustments which bring self-sufficiency than would the expenditure of an equal amount of public funds in direct relief, which would provide no permanent resource base.

(5) Erosion control, aided by publicly financed technical services, materials, and equipment, enables farmers to protect a basic national resource; as such, they are comparable to publicly financed education.

(6) Broad governmental programs for adjustment of agricultural production, for rural rehabilitation, and for soil conservation are examples of the national interest in the maintenance of a sound agricultural economy. The Nation as a whole cannot afford to waste its land and human resources

policy that the benefits of public works must exceed the costs in all cases, social or general welfare benefits must be considered. But what quantitative value have these and what expenditures are warranted for works serving these purposes? These are difficult questions but they must be answered if projects contributing such benefits are to be compared intelligently with projects, the benefits of which can be traced more easily. In the main, the task of devising workable yardsticks or general guides still lies ahead.

Some clue to the value of general welfare benefits may be gained from the reaction of those who ultimately would have to pay the costs. For instance, in the case of a public works project which has local intangible benefits, the reaction of the local unit of government toward repaying all or a part of the costs might be an indication of the value of the project. If a community is willing to repay all the costs of a project such as a recreation center, it indicates that the people of the community consider the benefits at least equal to the costs, even though such benefits are in the nature of social benefits and are not vendible. However, as the area affected by social benefits widens, the possibility of obtaining such public judgment becomes less.

The general welfare benefits of public works which offset emergency expenditures for direct relief, for example, can be reduced in part to quantitative terms. When many people are unemployed and without income, direct relief expenditures are necessary. However, public works activities which make it possible for unemployed people to create goods and services yield greater benefits through contributing to the Nation's total production and improving its natural resources. Such public works activities are part of sound public policy even though total benefits of such projects may be less than total costs in the sense of ordinary public accounting. The public expenditures in direct relief saved by such public works must be added to the positive benefits they create.

Evaluation of Multiple Purpose Projects.—In connection with multiple-purpose projects—principally those involving some combination of flood control, reclamation, navigation, power, and pollution control—the development of comparable measures of costs and benefits will also make a significant indirect contribution to the evaluation process. While the total dollars and cents costs of a specific project may be estimated with reasonable accuracy, the problem of apportioning costs of multiple purpose projects is exceedingly difficult. Efficiency and sound policy demand that all project plans consider all possibilities for serving related purposes regardless of the primary purpose of the project. Unless a commonly acceptable method for determining costs and benefits is developed and adopted, there is no objective basis for comparing the

Measurement of Social Benefits.—In establishing a

costs and benefits of each separable function of a proposed multiple purpose undertaking with the costs and benefits of either (1) an alternative single purpose project to serve the same separable purpose or (2) other projects which though unrelated in purpose must be compared in terms of their right to be included in a public works program. There may, for instance, be a proposed multiple purpose project for power, irrigation, and flood control, all of which affect the land use of the area involved. The manner in which the joint costs are allocated among these three functions will in part determine the ratio of costs to benefits assigned to any one function, as irrigation. By following one method of apportioning joint costs, the irrigation function would be deemed a desirable part of the combination, while under another method, irrigation would appear to be too costly.

Financing Public Works Affecting Land Use

It is not necessary here to discuss in detail the financing of public works affecting land use. However, some consideration must be given to financing in determining the comparative desirability and urgency of specific public works proposals. In judging a public works program or specific projects or types of projects within it, the allocation of ultimate responsibility for bearing the costs is important. This is especially true of public works which affect land use, such as flood control and highways; it is less true today of public works directly in the land-use field, for reasons stated earlier, e. g., the very large social benefits in land-use adjustment, conservation, and development.

Evaluation of costs and benefits is designed to indicate whether a project is worthy of being undertaken regardless of who pays the bill. The allocation of costs among beneficiaries poses the question: Who should pay the bill? It is quite possible that a proposal which rates high in terms of cost-benefit ratios would be given a priority well under that of a project with a less favorable cost-benefit ratio because of differences in arrangements for meeting the costs. Thus, a land-use adjustment project in the Lake States which provided for private, and for local, State, and Federal Government participation in the ultimate costs might rate above a similar project which offered little promise of local participation. This would be especially pertinent for projects whose effectuation required action under State law as well as under Federal law.

Public Policy in Allocating Costs.—In addition to being fraught with the previously mentioned technical difficulties of measuring intangible benefits and of allocating joint costs among functions in multiple-purpose projects, the allocation of costs also involves questions of general economic policy, fiscal policy, broad governmental policy, administrative feasibility,

and so on. It may, for instance, be quite feasible to estimate the benefits of an irrigation project and to trace those benefits to a particular area or group. Broad economic policy may, however, suggest that there are also general public benefits which should not be charged to the water users. In other cases, ability to pay may be the guiding criterion, as in irrigation projects under the Wheeler-Case Act, water utilization projects under the Water Facilities Act, and rehabilitation projects of the Farm Security Administration. Although it may be feasible to estimate the benefits of soil conservation and to trace those benefits to a particular group, State, region, or the Nation, it may not be desirable to allocate cost on this basis. Because of general economic depression, an overwhelming national interest in the total benefits, the fact that some of the fundamental causes of soil waste are beyond the ability of individuals or groups to correct, and because the activity must go forward in the interest of the people and the Nation even if local and State governments cannot participate financially, it may be preferable for the cost to be shared directly by the individual and the Federal Government.

The important consideration, therefore, is not that there should be a rigid formula for uniformly allocating the ultimate responsibility for bearing costs of all types of projects affecting land use. Rather, it is that a consistent general policy should be observed by all agencies advancing capital or making expenditures for similar types of projects. If a larger Federal subsidy is granted to beneficiaries of one public works project than to another, it should be only after adequate determination that differences in the public interest warrant the differences in subsidy.

Without general principles to which the various agencies advancing funds can adhere, there is room for lack of equity in spite of efforts of administrators to the contrary; and there is a possibility of abuse as a result of local pressures.

From the Federal point of view, the important decision that must be made within a consistent policy is: "How great is the general public interest and what proportion of the total cost should the Federal Government pay?" In periods of relatively high employment, the persons receiving directly traceable benefits in the form of increased income or services ordinarily should pay the cost of such benefits; the Federal Government should assume only the cost of those benefits which are very widely distributed, which contribute to an important national policy, or are part of a recognized Federal responsibility or function. In periods or areas of heavy unemployment, the Federal Government may properly assume such additional portions of the cost as may reasonably be assigned to the relief of unemployment and the stimulation of the economic system.

Varying Allocations for Different Types of Land-Use Projects.—In connection with the evaluation of public works projects in the land-use field, the Land Committee proposes to develop for each type of project a guiding set of principles directed toward answering the question: "How much of the total cost should the Federal Government pay?" For example, it seems feasible to develop criteria for all water-flow retardation and erosion prevention work under the Flood Control Act of 1936, as amended, which will permit consistency in allocating costs. The same would be true for forestry, soil conservation, submarginal land purchase and development, land settlement projects, and so on.

Advance of Funds; "Self Liquidation."—The ultimate responsibility for bearing costs must be distinguished from the original advance of funds. The Federal Government might well perform the banking function of initially financing the total cost of projects for which it expects in the long run to be completely reimbursed in the ordinary business sense. The Federal Government may stimulate employment, investment, and economic activity through "self-liquidating" activities of this sort without ultimately absorbing any of the cost. Self-liquidation in the sense of full return from vendible benefits should not, however, be a major consideration in comparing the desirability of public works. There are undoubtedly many projects which are not self-liquidating in this narrow sense but which, nevertheless, are more desirable because of a larger excess of benefits over costs. They may not be "self-liquidating" simply because the benefits are not vendible. In fact, activities which are completely self-liquidating in this sense might, if adaptable to private enterprise, be encouraged as private rather than public undertakings.

From the standpoint of comparing the desirability of specific undertakings, the question of who advances the capital is secondary. This is also true of the rate at which advanced funds are repaid which is significant only from the more general standpoint of the economic effects of timing Government receipts and expenditures. The responsibility for ultimate absorption of costs, however, is a primary consideration in comparing the desirability of specific undertakings. Proposed arrangements for financing should, accordingly, accompany all proposals for public works activities, including proposals for projects that affect land use or which are in the land-use field.

Functional and Regional Planning

Programming public works for the Nation should be part of the more general task of preparing (1) functional plans such as those for land use, water use, transportation, power, etc., and (2) regional plans in which all of these functions and economic conditions generally are considered for a particular region.

The appraisal of specific proposals for public works activities becomes hopelessly confused if not made within a framework of regional and functional plans. General objectives, criteria, and techniques for evaluating costs and benefits of specific proposals and guiding policies for allocating responsibility for bearing costs all have their place in the programming scheme. But the benefits of specific projects cannot finally be judged except with reference to a logical plan for orderly development of an area or of a function. The apparent benefits of an individual project, such as land purchase and development, may be closely related to the extent to which it can be coordinated with a more general group of undertakings, such as those designed to change the type of land use over a wide area from cash grain to grass and livestock. It is also true that the apparent benefits of an individual project may result in a loss of benefits in the same area, or even in a remote part of the country. For example, in the present situation the benefits of developing new and better land for the production of certain surplus crops may be at the expense of present producing areas unless poor land is simultaneously retired.

To repeat: In rural areas, all public works, including those not directly related to land use, those directly affecting land use, and those in the land-use field itself, should be in harmony with a general area program of land-use adjustment.

The coordination of individual projects with a logical and orderly plan for land-use adjustment, area by area, requires (a) that appraisal of projects be carried on in close consultation with all agencies involved in land-use adjustment; (b) that there be machinery in which local, State, and regional groups can aid in developing general land use, public works, and general economic plans for those areas; and (c) that sufficient funds be provided for such regional and functional planning.

The Land Committee is experimenting with a technique which is designed to facilitate the National Resources Planning Board's function of evaluating and programming Federal public works as provided in the Federal Employment Stabilization Act of 1931 and Executive Order No. 8455, June 1940. The approach involves (a) analysis of the factors affecting employment stabilization in each region including such basic considerations as resource maintenance, rebuilding, and development, (b) a statement of the readjustments necessary to achieve a greater degree of employment stabilization insofar as existing knowledge can determine, and (c) the determination of the appropriate place of public works in the fabric of all available public measures—local, State, and Federal—for bringing about stabilization of employment and development of resources.

The Significance of Timing

In programming public works and considering specific projects that might be made a part of that program, timing of expenditures for construction or other action and for operation must be kept in mind. The major goal toward which public works affecting land use can contribute is that of facilitating land-use adjustments which increase the capacity of the land to provide a permanent and satisfactory living for the people who live on it. Types of public works which contribute most to needed long-range adjustments should form the backbone of a program of public works affecting land use.

Long-Range Considerations.—The march toward this goal of increased capacity to provide a reasonably permanent base for a satisfactory living for people on the land is seriously interrupted by major swings toward economic depression and unemployment. To further the public works objective of economic and employment stabilization, it is necessary that the volume of public works and expenditures be varied considerably in some rough but predictable relationship to economic and employment prospects. The development of a reservoir of public works projects and activities which can be adapted to both these objectives is a fundamental justification for the advance planning, evaluation, and programming of public works. The hope is that public works affecting land use can be so scheduled that even in periods of extensive unemployment, when the total volume of public works necessary may be relatively large, those works would still be largely of a character that would contribute to long-range adjustments as well as absorb temporary unemployment. A large reservoir of projects that have high utility relative to costs and that can be fitted harmoniously into broader programs, nationally, regionally and locally, for land use and similar functional fields should reduce to a minimum the public expenditures on makeshift activities that contribute little to basic adjustments or the Nation's wealth. Planned for proper timing and properly timed, the increased expenditures for public works activities in periods of extensive unemployment can contribute significantly to the solution of fundamental land-use difficulties. Thus, watershed plans for run-off retardation and erosion prevention, authorized by the Flood Control Act of 1936, as amended; irrigation plans under the Reclamation acts; plans for water utilization projects under the Wheeler-Case Act; submarginal land projects; forest development and improvement; and others may clearly meet a dual objective.

Projects Flexible in Timing.—Within the total reservoir of public works projects, it is desirable that there be a considerable volume of works activities which are flexible as to the time at which they can be undertaken, and with respect to the rate at which they may be

carried forward to completion. Flexibility along these lines should be recognized as a favorable characteristic in evaluating many, though of course not all, public works projects and activities. For example, a rural works program, as suggested in the succeeding section of this report, could be quickly expanded or contracted to suit economic conditions.

Timing During Unusual Periods.—Special considerations of timing are necessary also in connection with such extraordinary situations as war and defense. The usual objective of long-range development of resources remains the same, but the stabilization of employment through normal public works projects may fade temporarily into the background. The immediate objective is the rapid production of military equipment and materials. Types of public works which interfere with the military objective may have to be postponed. In any case, activity in the defense industries may absorb a large share of the unemployed. Here a word of caution is needed. Extraordinary activity for defense must not result in a needless sacrifice of fundamental resource conservation and development; neither should it retard the orderly prosecution of surveys and development of plans which can be called into use quickly as defense expenditures begin to taper off.

Brief Statement of Principles for the Evaluation of Specific Projects

It may be helpful to list in brief form the principles for the evaluation and programming of specific projects suggested in the foregoing discussion. Persons actually engaged in the evaluation process will need to develop such a list as a practical aid in carrying on this work, and to supplement it with further considerations of an administrative character.

1. Technical soundness:

- a. Projects should be technically sound, including proper engineering sequence in construction, and based upon adequate data and investigations.

2. Costs and benefits:

- a. Total benefits should exceed total costs.
- b. Calculation of benefits and costs should include any nonmonetary and intangible factors affecting the welfare of the region or the Nation.

3. Financing:

- a. The ultimate distribution of the costs should be distinguished from the original advance of funds; the important consideration in distributing costs is that there should be consistency of policy among all agencies for related types of projects.
- b. In periods of relatively high employment, the persons receiving benefits in the form

of increased income or services directly traceable to them should ordinarily pay the cost of such benefits directly or through local government, and the Federal Government should assume the cost of only those benefits which are very widely distributed, contribute to an important national policy, or are part of an established Federal responsibility or function.

- c. In periods of heavy unemployment or in depressed areas, the Federal Government may properly assume such additional portions of the cost as may reasonably be assigned to the relief of unemployment and the stimulation of the economic system.
- 4. Relation to regional and functional plans:
 - a. Projects should harmonize with regional and functional development plans.
- 5. Priority:
 - a. Priority of projects should ordinarily be determined, taking into account the cost benefit ratio, arrangements for financing, relation to local and broad social values.
- 6. Timing:
 - a. Timing of projects should be planned to give the greatest remedial effect on both long-term and short-term dips in the economic cycle. Departures from this rule will be necessary to meet the needs of emergency situations.
 - b. Administrative considerations, such as continuity of program, effective use of personnel, and the securing of local cooperation, are also entitled to some weight in making decisions on timing.

The Land-Use Outlook and Public Works

It has been pointed out that the economic outlook must be ever in mind when attempting to determine desirable volumes and types of public works, and that public works must be an integral part of a broader land-use program. To suggest even the outlines of a program of public works affecting land use that extends 6 years into the future, therefore, requires an understanding of economic trends and of the probable outlook in the land-use field. The types of land-use adjustments that probably will be necessary must be considered. Public works must be planned and appraised with an eye to the present land-use situation and the needed land-use adjustments.

Roots of Rural Maladjustments

The land-use pattern of the United States was developed largely by trial and error. In most local areas,

land use has changed many times. As new lands opened on the westward march and their products flowed eastward, as Federal land policies changed, as new crops found their place in the scheme of production, and as technological developments revolutionized methods of production, the character of land use changed, and changed again. A New England county began with self-sufficient farming, shifted to cash-wheat production, then to hay and horses, and finally to dairying. A Georgia county began with self-sufficiency, changed to cotton, then to dairying, back to cotton, then to peanuts, and finally back to the beginning—self-sufficiency. A Missouri county succeeded at forest farming until the timber supply was exhausted, then tried cash crops, failed, and is now trying a combination of self-sufficiency, farm forestry, and recreational development. A Colorado county, opened under the Homestead Act, tried cash grain until the dry years came, then half the population fled as dust storms raged, and now the remaining farmers are attempting to turn to grass and livestock. And an Oregon county began with a combination of forestry, grazing, and cash-cropping, which succeeded well until the timber supply was gone; now it is attempting to reforest, extend the grazing lands, contract the cultivated lands.

So the land of the United States, most of it gradually transferred from public to private ownership, was developed.

Aside from publicly financed research and education, and the provision of a great deal of cheap land, little public assistance was required in this development. Land-use adjustments were made by individuals, without public aid. If one use did not pay, another would.

Until after the World War, and most of the time until the decade of the twenties, there was a profitable market at home and abroad ready to absorb all the food, fibre, and timber we produced. No matter how many mistakes were made—how recklessly the timber was cut, how seriously erosion proceeded, how intensively lands unsuited to cultivation were used; no matter how rapidly tenancy and rural poverty spread—it was usually possible for most individual producers to sell the products from the land at profitable prices. If wheat did not pay, hay and horses would; if cotton did not pay, peanuts or dairying would. If the land wore out, there was more to the West. If there were more people on the land than it would support, there were better-paying jobs in the city.

Changes that Marked the End of the Exploitive Period

Three great changes occurred within the last generation: (1) The United States became a creditor nation, a fact so overwhelming that few understood it; certainly those who use the land did not understand why such a

change should interfere so seriously with their foreign sales. (2) The physical frontier closed. There was no more new land to the West to move to. (3) The population trend changed. For many years the rural population had moved cityward; had industrial expansion continued unabated, there would be today from four to six million fewer persons attempting to live on the land than there actually are.

For the first time, the United States as a whole faces the task of changing its use of the land—nationally, regionally, locally—just as each local area changed its land use time and again in response to a multitude of forces and circumstances. But the individual cannot make the changes alone, as he once did. For one thing, there may be no profitable use of land to change to; for another, this new situation, largely an aftermath of the first World War, came too suddenly. Now a second war promises even more drastic changes. For another, the changes in land use now are required in all parts of the country—a problem too big for individuals or even organized groups—and finally, more people are trying to use the land than our present commercial system of farming will support at a profit.

The Nation's Change to a Creditor Status.—Up to the beginning of the first World War, Europe had invested heavily in the United States, sending its surplus capital here to build railroads and factories and develop the land. The United States paid part of the interest and the capital by exporting agricultural commodities to Europe. The war changed this. The Allies made not only large purchases of farm products but even larger purchases of factory goods. Five years after the first shot was fired, the debtor-creditor status had reversed. Europe owed the United States huge sums of money—debts she was unable to repay.

The United States had become a creditor Nation. But few, if any, changed their debtor-thinking to creditor-thinking. This may have been due partly to policies which obscured the truth for a time. By extending further credits to Europe, the United States artificially sustained a foreign trade—a trade flowing too much one way. Europe couldn't pay in cash, yet tariffs were lifted higher so she couldn't pay in goods. When the credits ceased, trade abruptly slackened. Surpluses of farm commodities accumulated.

While all this was taking place, the farm plant had continued to expand under the impetus of technical advancement and the cultivation of new land. Automobiles and tractors were releasing 30 to 40 millions of acres formerly used to grow feed for horses and mules. Many of these acres were put to use producing more of the crops of which there were surpluses.

The foreign market continued to contract. European nations especially, through tariffs, bounties, and other forms of subsidy to their own farmers, were doing

everything possible to increase their own farm production in order to be less dependent on foreign supplies; memories of short rations in wartime were vivid. Meanwhile, newly settled countries, such as Australia and Argentina, made a bid for a larger share of the world market, already shrunk by the efforts of the more populous nations to become self-sufficient as to food.

The repercussions in America were widespread, indeed everywhere, but they varied in severity. The South faced a vastly shrunk market and low prices, widespread erosion, badly managed forest lands, high tenancy, and serious rural unemployment. The Northeast suffered low prices, especially for fluid milk, forests were none too well taken care of, and some erosion had occurred, but not as severe as elsewhere. The Lakes States faced rural unemployment, low prices, hundreds of families with insufficient and usually inferior resources, serious tax delinquency and erosion. The Great Plains faced low prices, wind erosion, tax delinquency, migration. The West faced low prices, erosion, a declining forage base. All faced shrunk markets and the lack of immediately available alternative opportunities which the system of private enterprise and private ownership had always previously provided them.

The Physical Frontier.—For years the frontier to the West had been a national safety valve. The forest entrepreneurs who felled the timber in the East or the Lakes States could move westward to virgin stands. The family whose land played out could do likewise. The people of an entire area, feeling that it was becoming too crowded, could move West. The greatest single fact about the end of the frontier is that it brought the realization that there were no new physical resources to exploit. The American people had to live with what they had.

The Change in Population Trends.—The rapid advance of technology in rural land use was accompanied by a rapid decline in the number of farm people necessary to produce food and fibre for domestic use and for export. The development of industry for years provided city employment for surplus people from the land, but more recently the doors of industry have been closed to laborers from country and city alike. With the normal rural population increase, with fewer opportunities in cities, and with a greatly decreased net migration from the country to cities, a huge volume of unemployment and underemployment accumulated in rural areas. It follows that industrial expansion and a higher level of economic activity would aid significantly in relieving population pressure on the land.

Of course, rural unemployment has not affected all areas and regions with equal severity. Several areas

of chronic unemployment and poverty have developed which would most likely remain even with a boom in other sectors of the country. Geographic shifts in comparative advantage for crop production resulting from such factors as changes in technology, changes or extensions of the transportation system, changes in demand for agricultural commodities, and depletion of soils and resources have resulted in an extremely uneven distribution of rural unemployment and poverty.

Types of Rural Unemployment

Rural unemployment is not all of the same type. Many wage hands are totally unemployed; many others are dependent upon seasonal or part-time jobs; and many farm operators have limited resources or carry on types of farming which provide them with only part-time work. Many owners, tenants, or sharecroppers earn a partial subsistence by working perhaps 100 days a year on their farms—all that the farms will profitably permit—and a few additional days as hired laborers. This is true in many localities, but is especially a manifestation of single-crop areas, as for example in parts of the cotton South or the hard spring wheat territory. In such regions, the rational remedy—diversification—especially through dairying and other forms of animal husbandry, is not always feasible, or the farmer may lack the necessary capital.

The plight of the part-time laborer and the wholly unemployed, with no resources of their own, is still more serious. For example, forest industries do not now provide as much part-time employment as they once did. Part-time and full-time unemployment among rural people, either because they practice monoculture or because their farms are too small or because they have no resources at all, represents one of the greatest wastes of the American economy. In the workless days of our rural people is found a vast pool of potential labor, of wealth creation. If it can be tapped, the wealth producing capacity of the country will be increased enormously.

In summary, it may be said that much rural unemployment of all types has been due to the failure of the total economy to continue to expand as it did 50 years prior to the twenties; for had that expansion continued, from four to six million fewer people would now be trying to live and work in the country. In turn, this presents a problem requiring far-reaching public action, sometimes seemingly inconsistent action: Agriculture should be a commercially profitable enterprise, and much public and private action is designed to make it so. At the same time, there is not enough good farm land which, in economic-size units, will support all people now on the land in a commercially successful enterprise. Consequently, much private and public endeavor is directed toward aiding a great number of farm families

to make the best living they can on insufficient resources, often inferior in quality. Whether we like it or not, whether we approve or desire it or not, we now have side by side a commercial agriculture and all gradations of subsistence and part-time agriculture. Public assistance is designed to make the best of both situations while seeking a basic readjustment.

Public Assistance Prior to the Present War

Many public aids were initiated in view of our change to a creditor nation, and in view of low farm prices, the closing of the frontier, widespread resource destruction, the change in population trends, widespread rural unemployment, and maladjustment of people to resources. The largest effort was that to shift lands out of surplus, soil-depleting crops, and into soil-conserving crops. Conservation programs on public and private lands were launched. The neediest farm families were given loans, based on farm-management plans designed to make better use of the land. Young men from cities were put to work on forest and soil conservation. Lands requiring water to make them productive were brought under irrigation through large projects such as Grand Coulee, and small projects, such as those under the Water Facilities Act. Price-sustaining loans, ever-normal granary storage, crop insurance, the purchase and development of submarginal lands were all instituted in an effort to stabilize incomes, stabilize the use of resources, improve tenure relationships for those on the land—in short, to build toward a reasonably permanent system of land use. Some complementary State aids, including zoning, better management of tax-reverted lands, soil conservation districts, and so on, also came into play. However, too often Federal action has failed to accomplish all it could because of the failure of State and local governments to undertake the essential complementary action.

Current War Impacts and After

The current conflict of nations abroad is likely to have a further depressing effect on agriculture and is certain to call for still further adjustments in land use. The outlook for export commodities—cotton, wheat, flue-cured tobacco, lard, and some kinds of fruit—is far from hopeful. The general indications, regardless of the War's outcome, are toward a more restricted foreign market for American farm products. Defense preparations in this country can be expected to increase the domestic demand for many agricultural commodities. Certain products such as vegetables, certain kinds of fruit, dairy products, poultry products, and meat animals will benefit particularly. Areas in which export crops are grown will not benefit appreciably, and in the years immediately ahead additional land-use difficulties will tend to concentrate in these areas.

The defense expenditures and related activities are apt to give at least a temporary lift to the whole economy, and this, in turn, should result here and there in a temporary lessening of the pressure of population on resources. It may be that the temporary stimulus given by defense activities may so fuse with basic trends as to revive the long-term upward trend in economic activity. It may be that effective public and private action, other than through public works and expenditures, may be taken to offset the tendencies toward depression and unemployment that have inevitably followed war booms in the past. The likelihood is, however, that the tendencies toward depression and unemployment will be severe in the post-defense period and that some of the labor so released will attempt to find employment on the land.

War booms have not normally served to facilitate basic readjustments. They have, on the contrary, been pregnant with maladjustments. Even a temporary period of increased industrial employment, however, may provide the opportunity for making basic readjustments in the land-use field. Relatively higher prices for domestically consumed crops than for export crops, for example, may make shifts from wheat and cotton to dairying and livestock less difficult. The purchase of submarginal land, in changing from an intensive to extensive use, might be facilitated because the people now on the land could more readily find opportunities elsewhere.

New Types of Adjustment.—The land-use adjustments that will probably be required as a result of the world changes now under way may differ considerably from those necessitated in the previous post-war period. Thus far, for example, the South has attempted to meet the declining market situation by reducing cotton acreage on each individual farm. This type of reduction has gone about as far as it can. A further reduction in cotton exports, therefore, may lead to a complete shift out of cotton in large, high-cost producing areas and into dairying, livestock, fruits, vegetables, and poultry. This would mean, literally, a reconditioning of the economy of the entire area, perhaps much population displacement with unemployment already high, and certainly requiring many types of public aid, of which public works activities should be a significant part.

Land Use and Public Works In the Next Six Years

The foregoing summary of current and prospective conditions makes it clear that the Land Committee must dovetail its evaluation of public works and its formulation of a 6-year program with other public and private efforts designed to facilitate (1) shifts in types of land use and related shifts of population; (2) the

rebuilding and development of land resources by utilizing as fully as possible the increasing supply of rural labor; (3) the provision of facilities necessary to health, welfare, and good land use; and (4) the development of labor absorbing capacity in industrial activities. Certainly in connection with all of these, public works must play a significant part.

It is assumed that the total volume of public works over the next 6 years is likely to be large. In the early years, defense needs will require a rapid rise in public works that contribute to national defense. Orderly prosecution of works and programs already in process, current needs of the population, as well as sound preparation for employment absorption after the big wave of defense activity has passed, are not likely to permit significant slackening of nondefense activities designed to maintain and develop the Nation's resources generally.

In the land-use field, the war-time decline in foreign markets should put the Nation on guard. The needs of defense must not lead to a disregard of basic conservation and development activities. For example, the evidence is strong that rural unemployment will remain large even at the peak of defense expenditures and that income in export crop areas will be so low as to make it difficult for farmers to avoid soil depletion.

Therefore, a program of public works affecting land use during the next 6 years should be one that is capable of rapid expansion from the present level as defense activities slacken in the latter half of the period. It is possible that careful planning, the development and adoption of control techniques, and a natural rise in general economic activity may affect the otherwise depressing effects of a slackening in defense activities. But a public works program capable of rapid expansion during the next 6 years is, nevertheless, necessary. There remains a distinct possibility that a slackening in defense expenditures would, in the absence of public works, result in heavy unemployment and instability. For the period as a whole, the aim must be to have in readiness and encourage such activities, programs, and procedures as will make readjustments in the post-defense period least difficult.

All types of public works affecting land use cannot, of course, follow exactly the same pattern over the coming 6-year period. The 6-year pattern for various types of public works affecting land use will be conditioned by the land-use needs which different types of projects can aid in meeting, by their relative adaptability to the uncertainties apt to accompany defense activities, and by the soundness of specific projects which are planned and proposed.

Some suggestions concerning the pattern of the various types within the general program of public works affecting land use may now be made. Each

individual project within that pattern must be determined in accordance with criteria set forth in the earlier part of this report. It is convenient to consider these patterns in terms of principal lines of action needed in the land-use field.

Shifts in Land Use

Public works affecting or in the land-use field must not serve to freeze existing undesirable situations. For example, public works activities should not encourage a continuation of cotton production or cash grain production if the present system of land use is clearly obsolete. Come what may, it should be the aim to recognize basic trends and adjust to them rather than to put off inevitable and inescapable changes by ill-considered public activities. This is a changing world. No government can last long in it that aims at nothing more than a greater and better *status quo*. A public works program, insofar as it extends beyond the normal development of natural resources in a growing country, should be a dynamic means of helping correct maladjustments, and should be capable of being modified promptly as the specific objective at which the program is aimed has been brought about.

As previously indicated, many areas of the United States, notably in the South and the Great Plains, face the necessity of changing the type of land use. The Great Plains country is clearly headed for bankruptcy in small grains, but is unable quickly to shift to grass and livestock. The cotton South finds itself more and more pressed to adapt its lands to other types of agriculture and forestry. Many smaller areas have similar problems.

It is necessary of course to rely heavily on the initiative and facilities of private enterprises to get these adjustments made. There are, however, many governmental aids, Federal, State, and local—such as education, provision of machinery for planning, and financial aid—that can serve to hasten the essential adjustments. Some cannot be made without Government action, as for example, in many counties in North Dakota where, with 75 percent of all lands tax-delinquent and taxes pyramiding on lands not yet delinquent, the people cannot change from cash grain farming to livestock and grass, even though physical conditions demand it.

Public works can facilitate necessary shifts materially. The shifting to a more suitable type of farming often can be greatly aided by the public acquisition and development of land; by provision of irrigation and water facilities; by forest development; by range conservation and development. For example, in the Plains the need for public acquisition as a means for readjustment can be readily demonstrated.² In the South,

much of the depleted land should be retired from farming, and some of the land now used for cotton should undoubtedly be shifted to forestry, some to grass, fruits, vegetables.

Shifting lands to uses more appropriate in light of the economic outlook is a process that should not be allowed to lapse during the defense emergency. All haste is necessary if maladjustments are not to result in soil depletion and disaster for many farmers. Public works that facilitate necessary shifts in land use should be emphasized throughout the 6-year period ahead.

Utilizing Men and Building Resources

Rural Conservation Works Program.—In spite of the increase in employment that is apt to accompany the period of rapid defense preparations in the United States, many rural areas will continue to be burdened by considerable unemployment of both regular wage hands and those who work as farm owners, tenants, or sharecroppers at some time during the year. Areas such as the Southern Appalachians, the Great Plains, the Mississippi Delta, and the southern cotton country generally are faced with serious unemployment and poverty, will continue to be even in the period of large defense expenditures, and will still be when defense activities slacken; the intensity may change, but the fundamental problem will not.

A program for public works which affects land use must, therefore, give increasing emphasis to employment for rural labor and must, at the same time, yield permanent values in conservation and development of resources. Studies by the Department of Agriculture indicate that the areas in which population, poverty, and unemployment are most concentrated also are the areas in which the natural resources have taken the most punishment, are now farthest below par, and are in need of elementary protection and rehabilitation. These are the areas where erosion is worst, where soil depletion is most advanced, where forests have been most ruthlessly destroyed, where land resources lie unprotected against further abuse. These are the areas of the lowest incomes among farmers, areas where the cash income averages annually less than \$200 per family.

It should be clear that all persons in these areas probably cannot permanently make a living out of the land. The procedure should be to determine first which lands have a reasonable possibility of providing a self-supporting use for rural living and which have not. Following this, and with the aid of public purchase, the lands submarginal for agricultural use should be shifted to less intensive uses and the better land should be rebuilt. Public works should be so placed as to rebuild the more promising lands for the continuing use of a maximum number of people at lowest cost. This may

² National Resources Planning Board: *Public Land Acquisition, Part I. Rural Lands*. June 1940.

require that some of the public works which would absorb the excess labor of these areas be placed in areas where economic opportunity will more probably be available. Similarly, the development of opportunities in industrial lines, regardless of their location, must be emphasized as much as works which build up the land resources of depressed areas. The task of developing support for people now and prospectively crowded in areas with a high ratio of population to the soil resource is one of making opportunities available in land-use activities and in other activities simultaneously.

There are vast possibilities for absorbing unemployment and rebuilding both human and physical resources through public works by scheduling conservation and development activities on both public and private lands. Public works which both employ labor and build resources should be initiated now, and should be carried on at a moderate rate during the next few years. Every effort should be made also to plan intelligent activities of this type to be undertaken on a large scale if necessary in the post-defense period. These conservational and developmental activities on lands now in use would have the highest degree of flexibility, thus permitting appropriate timing of that portion of a public works program.

Land Settlement.—Several types of public works help farmers achieve stability, sometimes by developing new areas, sometimes by improving existing areas. These include irrigation, water facilities, some phases of flood control, drainage, and land clearing. In general, a long-range view requires that activities which bring good land into productive use at a reasonable cost be encouraged; but the development of good lands should be accompanied by the wise retirement of submarginal lands or a change in their use from intensive to extensive production. Moreover, such a policy requires effort to channel production into lines where surpluses are least burdensome. For the years immediately ahead, there must be a complementary program for stimulating the consumption of agricultural products.

In areas where new land has already been made available for settlement, such as the vast acreage in the Mississippi Delta which has become available as a result of flood control works, an orderly program of land classification, development, and settlement should be initiated immediately. Desirable public works which would contribute to orderly development should be undertaken as soon as possible.

In areas where existing settlers can be aided to a productive, self-supporting basis—as by aid in clearing land in the Lakes States, water facilities in the Great Plains, or drainage in the Mississippi Delta and other eastern areas—the relevant public works should move full speed ahead. In all such areas, a major need is

sound land classification. Without it, there is real danger of maintaining or encouraging production in areas submarginal for farming with all its well-known consequences.

In areas in which public works that facilitate land development and settlement are already under way, as in the Grand Coulee area, additional public works which follow as a logical sequence should be given favorable consideration.

In considering all types of projects and programs for land settlement, priority should be given to those which will make the best land available at least cost for the use of the maximum number of people.

Land Purchase and Development.—Public acquisition of the land is a basic tool for facilitating many types of adjustment, including the settlement of new lands and the retirement of submarginal lands. Through public acquisition of potentially good agricultural land the Government should, in its policies of development and resale or lease, guide settlement on new lands in such a manner as to avoid new maladjustments and poverty among settlers and so as to keep the benefits of public works from falling into the hands of speculators.

Public acquisition of submarginal lands is necessary to enable the poverty-stricken farmers on those lands to reestablish themselves and to permit, where possible, the desirable rebuilding of the soil up to a point where, in more extensive use, it can support a limited number of people. Public acquisition of submarginal lands is also essential in helping change the system of farming in large areas, such as the Great Plains; in rounding out the land phase of watershed protection works, such as in the Trinity River Watershed of Texas; in reducing the costs of public services, as in the Lake States, and in numerous other situations, detailed in the National Resources Planning Board report on Land Acquisition.

An orderly program should be maintained for the purchase of submarginal land so that public acquisition can be effectively correlated with other land-use adjustment activities.

Forestry.—A third of the land of the United States is forest land. Much of it is idle, wasting. Idle lands and idle men challenge the ingenuity of the Nation. The development of the Nation's forests, both in public and private ownership, is highly necessary as a long-run matter and highly desirable immediately as a means of providing opportunities for productive employment to rural people. Forest development activities have a general flexibility which makes them a significant part of a public works reservoir designed for rapid adaptation to employment needs, as well as for resource development.

Soil Conservation.—Despite all that has been done, the soil resources of the United States are still on the downgrade. The rate of loss has been reduced, but

serious loss continues. A desirable national goal, for the time being at least, is to get on a maintenance basis. Much of the essential control work must be done by private individuals. But it has been made clear in this report that public agencies must also do a great deal on both public and private lands as stated in connection with the suggested rural works program for special areas. Soil conservation work generally provides useful employment and helps build resources and should, therefore, be aided in any public works program.

Range Improvement.—Vast acreages of western range lands, on which a large part of the livestock industry depends, are seriously depleted. This is true of Federal, State, and privately owned lands. All types of works such as water-spreading structures, stock-water tanks, and contour furrowing, designed to check erosion and improve the forage, are necessary and desirable. These developments may be quickly started, and quickly stopped. They can provide useful employment for many skilled and unskilled workers. The range is a basic resource which must be improved.

Recreation.—Recreational areas, such as the national parks, should of course be included in public works programming. Useful work can be provided during the development period, and the recreational areas are a priceless asset to the Nation.

Public Facilities

Rural.—Among the public works affecting land use, those that provide the usual public facilities, such as roads, schools, parks, and public buildings, play a significant part. They are all subject to effective timing if properly planned, although the maintenance costs of public roads are rather inflexible. Public roads involve a vast amount of money and are therefore useful in timing public expenditures for employment stabilization. In planning the construction of rural roads, every effort should be made to assure their consistency with general land use plans; the spectacle of building, and maintaining roads in areas which should be, and are, moving out of use is all too common.

Rural housing, rural electrification, and rural health facilities cannot be emphasized too strongly in the period ahead. The building of the resource, "healthy and contented men" is important in normal times, vital in time of stress. Both housing and health facilities contribute to this objective. Rural electrification contributes to better living, is a key factor in the development of dairying in the Southern States, and increases rural income in many situations. Rural electrification also encourages industrial decentralization. All of these types of activity are adaptable or rapid changes in scheduling public works expenditures and sound projects in these categories may well bulk large in a reservoir of public works over the next 6 years.

Urban.—The provision of such facilities as roads, streets, schools, hospitals, sewage-disposal works, and houses are important in connection with urban as well as rural land use. From the standpoint of improvement of living conditions, the development of sites, facilities, and surroundings for urban areas is highly important. It may also be noted that municipal public works have in the past played a much larger part in the public works program of the Nation than is true today. In part, the increase in Federal works expenditures in recent years has been offset by the decline in local works expenditures. In the years ahead, a national public works program should include necessary municipal works scheduled in harmony with urban plans and in harmony with a public-works program for the Nation as a whole.

Development of Industrial Activities

In spite of all that can be done to facilitate adjustment to basic trends and changing demands for agricultural products, and after all possible is done to increase the capacity of land resources to provide a living for people, it appears evident that employment opportunities for many more people now on the land must be found in industrial and service activities.

Public works should, therefore, aid in the development of new industrial activities both in rural and in urban areas. The development of electric generating and distributing systems in areas of potential industrialization should be encouraged. The development of processing industries which use raw materials and labor abundant in depressed areas could do much to relieve the pressure of population in purely extractive activities. In the South and in the Lakes States, for example, the development of industrial activities for processing forest products could well be given emphasis. In many areas, where a shift from submarginal agriculture into more productive activity is desirable, such a transfer is obstructed by lack of skills. In these areas, public works that will assist in providing the required training in service and industrial pursuits should be encouraged.

In connection with developing new areas, every effort should be made to increase industrial activity at least as much as agricultural activity. The Grand Coulee project is a good illustration of an attempt to plan for new industrial as well as agricultural development. Throughout the economic system, a successful land-use program during the next 6 years requires that industry absorb a part of the "surplus" population on the land.

The location in rural areas of industrial plants needed under the defense program may temporarily contribute to industrial absorption of rural labor. In considering projects for the location of defense industries, adequate

plans for post-emergency liquidation should be required. Insofar as possible, defense industries should be placed in areas of heavy rural population pressure which also have industrial potentialities (such as raw materials,

transportation facilities and power in addition to an adequate labor supply); such placement may provide an original stimulus to industrial activities that can be maintained permanently.

WATER DEVELOPMENT POLICIES

INTRODUCTION

The Water Resources Committee of the Board has prepared a number of reports dealing with special aspects of national water policy over the last several years. During the past year a special subcommittee has assembled materials and submitted a report on National Water Policy to the Committee. This group consisted of: Harlan H. Barrows, University of Chicago, *Chairman*; Milton S. Eisenhower, Land Use Coordinator, Department of Agriculture; James Lawrence Fly, Chairman, Federal Communications Commission; Leland Olds, Chairman, Federal Power Commission; John C. Page, Commissioner, Bureau of Reclamation, Department of the Interior; Brig. Gen. T. M. Robins, Assistant to the Chief of Engineers, Corps of Engineers, U. S. A. (General Robins dissented); and Clifford H. Stone, Director, Colorado Water Conservation Board.

Members of the staff who assisted included: Gilbert F. White, Secretary, Water Resources Committee; S. H. Thompson; Lincoln Gordon; and C. McKim Norton.

The following report has been approved and submitted to the Board by the Water Resources Committee, consisting of:

Abel Wolman, Johns Hopkins University, *Chairman*.

Harlan H. Barrows*, University of Chicago.

Milton S. Eisenhower, Land Use Coordinator, Department of Agriculture.

Edward Hyatt, State Engineer of California.

Leland Olds, Chairman, Federal Power Commission.

John C. Page, Commissioner, Bureau of Reclamation, Department of the Interior.

Glenn L. Parker, Chief Hydraulic Engineer, Geological Survey, Department of the Interior.

Theodore B. Parker, Chief Engineer, Tennessee Valley Authority.

Thorndike Saville, Dean, College of Engineering, New York University.

Maj. Gen. Julian L. Schley*, Chief of Engineers, Corps of Engineers, United States Army.

R. E. Tarbett, Senior Sanitary Engineer, U. S. Public Health Service.

Julius T. Wendzel, in Charge Interdepartmental Coordination, Office of Land Use Coordination, Department of Agriculture.

*Dr. H. H. Barrows and Maj. Gen. J. L. Schley dissented.



WATER DEVELOPMENT POLICIES

National Water Policy

In earlier reports, the Water Resources Committee has emphasized the need for a unified national water policy, embodied in legislation and consistently reflected in administration, that would promote the full use of the water resources of the country for all useful purposes so combined as to yield for society maximum total benefits at minimum total costs.

Existing Unrelated Policies

From time to time, national policies have been devised to meet particular needs, to satisfy special demands, and to serve single purposes. Thus, inland commerce in early days gravitated to usable waterways, insistent demands arose for their improvement and extension, and more than a century ago the Federal Government accepted responsibility for their development as highways of interstate commerce. But for years, the potential by-products of navigation projects were not given sufficient consideration. The settlement of the arid west created a need for large-scale reclamation impossible of accomplishment by individuals or communities, and in 1902¹ the Federal Government assumed the responsibility of reclaiming dry land in that region to make productive homesteads. But at first there was no provision for the sale of surplus power necessarily created at reclamation dams. Industrial growth and technological progress resulted in a demand for the hydroelectric power potentially available at thousands of falls and rapids, and in 1920² the Federal Government recognized its obligation to regulate the development and use of power on streams subject to Federal jurisdiction. But regulation of power sites is only one phase of the control and development of rivers. Settlement on fertile bottom lands along the banks of navigable rivers was also settlement in the paths of destructive floods, and after a series of unprecedented disasters the Federal Government responded in 1936³ to a clamorous demand for flood protection by assuming a responsibility to improve or participate in the improvement of navigable streams and their tributaries throughout the country for flood-control purposes. But the Flood-Control Act of 1936 did not deal with the flood problem in its mutual relationships with certain other water problems. So the special needs of different times created demands for special legislation which, when enacted, set up special policies.

In recent years, the inadequacy of such unrelated legislative policies devised to meet single water problems has received increasing recognition both within

and outside of the Congress. No matter how efficiently each administrative agency handled the special water problems assigned to it, the various programs could not be blended into a unified pattern of sound development. The interrelations between different types of water problems and between water problems and land problems, those between the projects of different drainage basins, those between the various projects of a single basin, and even those between the potential aspects of a single project, necessarily were neglected in greater or less degree. In general, the development of water resources was fragmentary and unbalanced.

A growing realization that unrelated projects built for single purposes involved waste, invited controversy, and threatened the future utility of many rivers, led to attempts in 1909 and 1916⁴ to secure comprehensive legislation designed to preserve and develop all the values inherent in the rivers of the country. Though these attempts failed, they provided a useful background for more recent renewed efforts.

In various special fields, the Congress has taken successive steps toward the formulation of a comprehensive policy. The statutory record of the past decade reveals a spreading conviction that haphazard development of water resources is harmful economically and socially and that the coordinated development of multiple-purpose projects for the complete utilization of these great resources on a national scale is essential.⁵ More is needed, however, than the revamping of old policy and old procedures. The time is now ripe for the next step in the evolution of policy. What is needed is the adoption by the Federal Government of a unified water policy under which provision can be made for prudent, orderly, balanced, full development of the water resources of the Nation.

Essentials of a Unified Policy

In considering the requisites of such a comprehensive national water policy it should be recognized that existing legislative and administrative directions by which executive departments and independent establishments of the Federal Government deal with water resources are in many cases *inadequate* to provide for (1) efficient budgeting, authorizing, carrying out and reporting of surveys and investigations of interrelated water problems, (2) coordinated planning, designing, construction, and day-to-day operation of multiple-purpose projects for the fullest practicable utilization

¹ Culminating in section 18 of the Act of August 8, 1917, 40 Stat. 269, repealed by the Federal Water Power Act of 1920, 41 Stat. 1063.

² Landmarks in the evolution of integrated planning are the so-called "303" reports prepared under authority of H. Doc. 308, 69th Cong., 1st Sess., an outstanding example of which is the report dated March 15, 1930, on the Tennessee River, H. Doc. 328, 71st Cong., 2nd Sess. Many similar reports were prepared under authority of the Flood Control Act of May 18, 1928, 45 Stat. 534; 33 U. S. C. 702a, et seq.

³ National Reclamation Act of June 17, 1902, 32 Stat. 388; 43 U. S. C. 372 et seq.

⁴ Federal Water Power Act of June 10, 1920, 41 Stat. 1063; 16 U. S. C. 791 et seq.

⁵ Act of June 22, 1936, 49 Stat. 1570; 33 U. S. C. 701a et seq.

of river systems, (3) the proper division of the costs of projects of national significance among Federal, State, and local political units and the various groups of private beneficiaries, and on multiple-purpose projects the proper allocation of costs among the several functions, (4) an orderly sequence in the development of projects, and (5) the effective timing of the construction of projects to relieve unemployment during periods of business depression.

In promoting the establishment of a unified national water policy, the Congress might well affirm or reaffirm its intention to foster economy and efficiency in dealing with water problems, to safeguard investments of Federal funds in projects built for the control or use of water resources, to protect the just rights in water resources of States, of subdivisions of States, and of individuals, to aid and protect the legitimate interests of water-borne interstate commerce, to strengthen the national defense by increasing the utility of strategic rivers and other water bodies and by decreasing the hazard of destruction from uncontrolled waters, to develop public lands and to promote improved use of all lands, to protect watersheds and water supplies, to safeguard the public health, and to promote social security and the general welfare by furthering the development and utilization of water resources.

As an aid to accomplishment of the foregoing general objectives in an inclusive, consistent, balanced, and orderly manner, it is recommended that it be the declared policy of the Federal Government:

1. To provide for plans based on adequate and reliable data⁶ for the unified regulation and development of the river systems of the United States for all the beneficial purposes in effective combination that are properly attainable, including, insofar as relevant, (1) navigation, (2) flood control, (3) protection against droughts, (4) irrigation, (5) development of hydroelectric power, (6) drainage, (7) water-flow retardation, (8) reduction of erosion and siltation, (9) abatement of pollution, (10) provision of water supplies, (11) enhancement of recreational opportunities, and (12) conservation of fish and wildlife;

2. To provide for programs for a definite and effective order of construction of the projects included in such river-system plans, and to construct the projects as rapidly as considerations of economic and social justification and budgetary requirements may warrant;

3. To provide that programs be formulated for accelerated construction of approved projects during periods of business depression as an aid to prevention of unemployment and in times of danger as an aid to defense;

4. To take proper account, when considering specific water projects, of social benefits as well as economic benefits, general benefits as well as special benefits, potential benefits as well as existing benefits, wherever they are involved;

5. To provide sound and prudent financing for appropriate water projects, while restricting Federal contributions to projects that affect both national and local interests to amounts warranted by all the national interests involved (subject to the provisions of par. 4), and while otherwise obtaining, insofar as practicable, an equitable distribution of project costs;

6. To assist in the settlement of controversies over interstate waters between two or more States by promoting cooperative investigations designed to establish all relevant facts and by facilitating the negotiation of equitable interstate compacts based on such facts;

7. To provide for systematic and effective consultation and cooperation by the executive departments and independent establishments of the Government with one another and with agencies and persons in the several States in order to formulate such plans and programs as above set forth;

8. To encourage States and subdivisions of States to adopt reasonable regulations for curbing the wasteful use of water resources, both those on the surface and those underground, and for promoting the public interest in such resources;

9. To eliminate inconsistencies and conflicts between or among existing laws and regulations under which executive departments and independent establishments of the Government conduct investigations and surveys relating to water resources and finance, construct, and operate works for their control or utilization.

Integrated Water Planning

Planning for the control and use of water is essential to the public welfare. Unplanned action with respect to water problems is rash; inadequately planned action, common in the past, is hazardous. Every water plan should be based on reliable and adequate data, on facts, on all pertinent physical and cultural conditions, both those which exist and those which can be foreseen.

Tests of a Sound Water Plan

If water planning is to be practical and of maximum utility, the resultant plans must meet successfully the tests indicated in the following statements, abundantly confirmed by the experience of many agencies and repeatedly affirmed in essence by the Water Resources Committee.⁷

Multiple Purposes.—No matter what the originating

⁶ Types of basic data most urgently needed are outlined and discussed in National Resources Committee, *Deficiencies in Basic Hydrologic Data*, 1936, and National Resources Planning Board, *Deficiencies in Hydrologic Research*, 1940. They include precipitation, snow and ice, run-off, ground water, evaporation, and quality of water.

⁷ National Resources Committee, *Drainage Basin Problems and Programs*, 1936, pp. 2-3, and *Drainage Basin Problems and Programs: 1937 Revision*, 1938, pp. 7-10, 68-120.

purpose of a project, whether improvement of the navigability of a river channel, development of a power site, protection of a city from floods, or something else, every other reasonable purpose must be considered adequately in determining its final scope and character if the project plan be sound. Many projects, though inspired by a single need, afford practicable opportunities for combinations that would multiply benefits and in most instances reduce the cost of each of them below what it would be if the benefit were sought alone. Failure to recognize, appraise, and, insofar as feasible, develop the multiple potentialities that may be inherent in a project of magnitude is not only to invite waste but perhaps also to preclude later highly desirable development in the place involved. Unwise action today may prevent wise action tomorrow. For example, many power dams built in the past have become objectionable because they impede the full utilization of the potential resources of the basin.

Project Interrelations Within Each River Basin.—A large project cannot be planned wisely, if considered, however fully, by and for itself alone. It may affect and be affected by other projects or opportunities for projects. Thus, water diverted from a stream for one locality has upon occasion reduced inequitably the supply available for localities farther downstream. Again, flood protection for a river city has been sought by construction of a reservoir at a site where only the storage of flood waters is practicable, whereas at another site related just as strategically to the city seeking protection both an equal storage of flood waters and the development of power would have been practicable.

Such interrelationships between projects in the same river basin result from the mobility of water and the unity of river systems. It follows that river systems cannot be divided satisfactorily for major water-planning purposes. The upstream and downstream segments cannot well be treated separately. Plans for interstate rivers cannot stop at State lines. The mutual adjustment of related problems and purposes throughout each river system must be promoted if planning and plans are to have maximum effectiveness.⁸

It is obvious, of course, that here and there along the tributaries of any large river there are likely to be minor problems which can be solved without significant effect upon the river system to which the tributaries belong. Such problems do not materially affect one another or problems of wider scope and are themselves not materially affected by the others. They belong to the field of local water planning, as distinct from regional and national planning.

⁸ In the Missouri basin, the Fort Peck Reservoir was constructed to aid in providing a 6-foot navigation channel in the lower river without taking into account the requirements for irrigation water in the upper river. A study of the possibilities of agriculture and of navigation in terms of the available supplies of water and their most beneficial use will be desirable before additional storage reservoirs are constructed or additional diversions are made.

Inter-Basin Relationships.—Plans for a unified group of projects in a given river basin and for the individual projects which comprise the group cannot properly ignore related conditions outside the basin. Many water problems transcend the boundaries even of large river basins.

In some instances, water itself may be diverted advantageously from one basin to another.⁹ Undertakings in one basin may be influenced profoundly by complementary or competitive enterprises in another basin. Appropriate consideration of regional, inter-regional, national, and even international relations is an essential of over-all water planning.¹⁰

Allowance for Shifting Conditions.—If plans for the control and use of water are to have full utility in the public interest, they must be dynamic to the greatest degree practicable, not static. The long view, no less than the broad view, is desirable, but it is limited and circumscribed by unforeseeable conditions. The future requirements of most areas for water will be influenced by unpredictable changes in population density, in land use, in business and industry, in social needs and conditions. Such changes will themselves be influenced by the supply of water. The supply now available may be insufficient for present needs. How much it can be increased may be unknown. The total supply, available and potential, may be altered from time to time by natural processes or by human action. For these reasons, water plans will need revision indefinitely and water planning will be required indefinitely.¹¹

In designing individual structures as components of a unified plan, provisions and allowances should be made, if feasible, to meet new needs which may arise. The desirability of so doing was recognized, for example, by the provision for the installation of penstocks where power development is deemed feasible in dams built under authority of the Flood Control Act of June 28, 1938.¹² In formulating or revising a plan for the regulation and utilization of a river, all projects with benefits greater than costs should be included, and no design for a project under the plan should be approved because of a high short-term rate of return if it would prevent later development of a larger project of promise with a lower ratio of benefits to cost.

⁹ Outstanding examples of diversions which are serving to promote the economic growth and stability of the populations of adjacent drainage basins are those from the Lower Colorado River to the Los Angeles Metropolitan Water District, and from the Upper Colorado to streams of the Great Basin in Utah.

¹⁰ In the Lower Colorado basin, effective plans must consider, in addition to water requirements in the Upper Colorado basin, demands for water in the adjoining Southern California and Upper Rio Grande basins, in Mexican portions of the basin, and in both Mexican and American parts of the Lower Rio Grande basin.

¹¹ During the past 10 years, the greatly increased demand upon water supply and sewer facilities created for a time by the development of air conditioning equipment required large-scale revisions in estimates of municipal water requirements and needed sewer capacities; estimates of water requirements were increased notably, and then after approximately 5 years were reduced to earlier amounts as a result of improvements in techniques for using cooling water.

¹² 52 Stat. 1215; 33 U. S. C. 701a et seq.

Integration With Broader Problems and Interests.—Water problems project themselves into every phase of earth economy. They merge into problems relating to the use of lands, minerals, and forests, into problems of business and industry, into problems of social welfare and national defense. Any sound water plan formulated and promoted by a public agency, Federal, State, or local, or through the cooperative efforts of such agencies, will seek, above all else, to promote *public interests*.—In the final analysis it will be concerned primarily with the promotion of public safety, health, convenience, and comfort, and with the establishment or maintenance of high levels of living. To these ends, it will seek the widest equitable distribution of benefits among beneficiaries.

Economic Soundness.—No project plan is sound unless it meets the test of economic desirability by showing (a) total benefits greater than total costs, and (b), in multiple-purpose projects, benefits from each function greater than the separable costs incurred *solely* in serving that function. (See more extended discussion, pages 35–36.) Alternative means of serving each function should be considered, and no function should be undertaken if its separable costs exceed the total cost of an alternative means of supply. As far as possible, the scope of a project should be expanded (in respect to any or all of its purposes), or provision made for expansion in the future, to the extent that incremental benefits exceed the incremental costs of expansion.

All types of benefits and costs should be evaluated upon a consistent and comparable basis.¹³ The appraisal should give due weight to relatively intangible social benefits as well as to tangible economic benefits (e. g., recreation as well as power). It should cover potential benefits (like improved use of land freed from flood risk) as well as actual benefits (reduced flood damage to existing property). It should consider general benefits accruing to entire communities, national, State, or local (like national defense or city-wide flood protection), as well as special benefits attaching to particular individuals or groups. In periods of general economic depression, or in instances of regional economic depression, it should take into account secondary benefits from reduction of unemployment and stimulation of business by public works spending, as well as primary benefits due to project operation. On the cost side, similarly, the appraisal should consider relatively intangible and indirect costs (such as those that may result from the displacement of people from reservoir lands), as well as direct costs of construction, maintenance, and operation.

Established Legal Rights and Responsibilities.—In seeking the ends already indicated, a sound water plan must scrupulously observe the legal rights of individ-

uals, groups, and States, wherever they are involved. If such established rights are not in the public interest, they should be altered or withdrawn by due process of law; meanwhile, they should be recognized fully. But rights with respect to water are accompanied by responsibilities concerning it. While claiming their rights, individuals, groups, and States, no less than the Federal Government, should fulfill their responsibilities.¹⁴ A sound water plan will recognize and abide by these axioms.¹⁵

Financial Relations.—Finally, any sound water plan of magnitude must reflect adequate consideration and equitable determination of such financial matters as the allocation of joint costs among the several purposes to be served and the repayment of expenditures. These subjects are considered on pages 31 to 38.

Plans for the regulation and development of river systems are inevitably both comprehensive and complex. They cannot meet the tests that are stated categorically or in substance in the preceding paragraphs unless they result from coordinated surveys and studies by experts in various fields. The call is not for the elimination of specialized investigations, but for their adjustment one with another and their coordination into a unified product. There is probably not a single undeveloped water project of large size that does not have multiple possibilities, and yet many such projects have been appraised even recently from particular and restricted points of view by different Federal agencies between which there was little or no cooperation.¹⁶ The desirability of complementary and coordinated investigations leading to integrated plans is obvious. Cooperation has received wide recognition in principle, and has been increasingly practiced, but not yet to a sufficient degree. Uncoordinated planning by individual agencies that focuses solely or disproportionately on a single purpose should give way to joint planning by all the agencies for all the useful purposes that are attainable and feasible. This change, if general and effective, will require Congressional action, or Executive action, or both, and the adoption of a new policy and a new procedure.

Survey Authority and Deficiencies in Present Procedure

For more than a century, the Congress has from time to time directed Federal agencies, in a series of largely unrelated authorizations and appropriations, to investigate water resources and to prepare plans for their

¹³ Among such responsibilities are those of financing desirable local projects, of regulation of water wastage and water pollution, and of preventing unsafe water-control structures, as described on pp. 40–41.

¹⁴ The words "rights" and "due process of law" are used in a realistic sense which recognizes the necessity for continuing changes in the conception of their meaning in the light of developing human needs.

¹⁵ An example is the reports of the Bureau of Reclamation and the Corps of Engineers on Cherry Creek, Colo.

¹⁶ Present defects in methods of evaluation are outlined at pp. 31–32.

control and use. The first statutes gave a few agencies restricted authority to survey specific water problems. As the complex nature of water problems came to be recognized in larger measure, survey authority was extended to additional agencies and was broadened. The cumulative effect is that Federal agencies, taken together, now possess ample authority to investigate all significant aspects of water control and development.

Outstanding grants of authority are summarized in Table I. Several Federal agencies—the Bureau of Reclamation, the Corps of Engineers, and the Federal Power Commission—when surveying irrigation, flood control, or water power possibilities, respectively, possess virtually unlimited authority to investigate all phases of water control and development. The Department of Agriculture, the Fish and Wildlife Service, and a few other agencies have authority to make broad surveys in their respective fields of interest. Under its annual appropriation, the Geological Survey may investigate any phase of water control or use.¹⁷

Notwithstanding these general authorizations, present survey work is unsatisfactory in two major respects. First, unified project plans are not prepared by a means which insures their conformity one with another, or in a form suited to effective use. Reports by different agencies on the same problem or area may be forwarded to the Congress independently and without reconciliation of conflicting recommendations. For example, the Bureau of Reclamation recently prepared a plan for irrigation, power, and flood control for the Kings River, Calif. The Corps of Engineers prepared a plan for flood control, power, and irrigation for the same river. Conflicts between provisions for financing and operating the proposed Pine Flat project were apparent in the two reports as transmitted to the Congress. When two such reports are transmitted at the same time, the difficulties encountered by a legislator in ferreting out the points at issue are minimized, but when they are released in different years, the obstacles to judicious review by legislative groups are great. Such difficulties would rarely, if ever, occur provided the plans of two or more agencies were correlated and the reports submitted concurrently by them.

Second, present procedures do not adequately promote cooperative surveys. As already noted, cooperative investigations will be essential to thorough water planning so long as the responsibilities for investigations are divided.

Several factors have restricted the use which has been made of broad survey authority. (1) For the most part, legislation has given *permission* either to

consider all related functions or to prepare less inclusive plans, but it has not *directed* the agencies involved to do the one thing or the other. (2) The policy of the Congress has been to develop Federal agencies to deal with specific functions rather than with the combination of functions involved in the integrated control and development of water resources. No one agency as presently constituted (with the exception of the Tennessee Valley Authority in its area) is organized or equipped to carry out all phases of a comprehensive water-resources survey. (3) In the absence of a stated national water policy, coupled with the lack of adequate directive instructions from the Congress as to what should be considered in making water plans, each agency has tended to limit the scope and emphasis of its investigations to one or two functions with which it is concerned primarily.

These problems of cooperation in surveys and of coordination of plans, increasing in urgency with passing years, have been recognized for some time and various steps have been taken to solve them. For example, the Act of March 1, 1917¹⁸ provided for inter-departmental cooperation for surveys (see Table I); the Departments of War, Interior and Agriculture have joined in the so-called "Three Party Agreement" of August 8, 1939, to provide for cooperative investigations; Executive Order No. 8455, dated June 26, 1940, has been issued to promote the correlation of public-works construction programs and to avoid conflicts in priority and design; joint Federal-State investigations have been organized in the Upper Rio Grande, Pecos, and Columbia basins; forty-five drainage basin committees have been created by the National Resources Planning Board through the Water Resources Committee to facilitate cooperation among Federal and State agencies in their conduct of investigations relating to water resources. Although the measures adopted provide a basis for development of coordinated surveys and plans for water projects, they need further implementation in order to constitute a more satisfactory and permanent system.

Recommended Changes in Procedure

To assist in producing plans which will meet the tests set forth earlier in this report, the process of making surveys should be improved at two points. At their *initiation*, surveys should be organized so as to utilize the services of the agencies best suited to handle all important phases of all the problems that are involved. The services of several agencies are likely to be needed in dealing with complex problems. At the *completion* of the surveys, findings should be correlated so that they will be consistent with one another and in accord with national water policy. The most important action

¹⁷ Under its organic act of March 3, 1879 (20 Stat. 394: 43 U. S. C. 81 et seq.) the Geological Survey is also authorized to classify the public lands and examine the geologic structure, mineral resources and products of the national domain.

¹⁸ 39 Stat. 948: 33 U. S. C. 701

is that taken at the initiation stage, because the arrangements for carrying out a survey will determine in large measure the quality of the results.

Experimentation in ways of making improvements at the two points indicated is now going forward under the terms of Executive Order No. 8455. Experience to date supports the belief that each important investigation contemplated by a Federal agency should be thoroughly analyzed before detailed work is initiated in order to determine its relation to the proposed work of other Federal agencies and of State agencies. Opportunity should be provided for free exchange of technical opinion among interested groups. The objective which the executive establishment should seek is the preparation of a national program comprising all types of water surveys considered to be important and significantly related one to another. A schedule of needed work should be drawn up and revised from time to time, showing, with priority classifications, how the proposed survey activities of each agency would be related to those of the others and how the needs of each drainage area could best be met year by year. Such a schedule would be useful to the Bureau of the Budget, of course, in considering estimates of appropriation. Provision should be made for promoting, during the progress of surveys, the recommended amount of cooperation among participating groups having related interests. Before the results of surveys are released they should be reviewed to make certain that the recommendations are not needlessly in conflict with those of other surveys, to combine findings wherever practicable, to assure compliance with national policy, and to afford opportunity for relevant comments by all participating agencies and other interested agencies.

In order to expedite the preparation of plans by the process here proposed, a more general understanding of the various agency functions is desirable. Cooperation in survey work makes possible the use of experts in many special fields, some of whom may not be found in any one agency. Each Federal agency has achieved outstanding competency in one or more segments of the broad field which it is authorized to investigate.¹⁹ Each should be expected to lead in improving surveys and survey techniques in its functional centers of specialization. Likewise, each agency properly should look to other agencies for participation in their outstanding specialties.

No sharp boundaries can be drawn between agency functions. There are *centers* rather than *domains* of interest and competency. The Corps of Engineers could not wisely neglect to consider recreational values in investigating flood-control reservoirs simply because the National Park Service has principal responsibility among Federal agencies for planning recreational facilities. At the same time, the Corps should be able

to look to the National Park Service for advice on methods of evaluating recreational benefits, and for direct aid in surveys involving large or complex problems of recreation.

Mutually helpful relations among the many specialized Federal agencies dealing with water would be facilitated by definite recognition of the central responsibilities of each of them. Needless friction over matters of jurisdiction would thus be reduced, duties in cooperative surveys would be reorganized more readily, and responsibility for constructive leadership would be fixed.

Finally, the correlation of agency efforts in planning and organizing surveys and investigations and in presenting joint findings or harmonious concurrent findings requires the assistance of a coordinating agency, the full need for which is stated in the following paragraphs.

Coordinating Agency

As already indicated, sound water planning on a national scale calls for coordinated effort by Federal, regional, State, and local agencies. Such effort necessitates organization. The keystone for such organization is a Federal coordinating agency which should include provision for water planning. Coordination in the field of water resources, however, to be most effective must be associated with similar activities with regard to land, minerals, energy, and other resources and productive facilities. Thus, the group charged

¹⁹ The present *principal* responsibilities of Federal agencies for water-resources surveys may be summarized substantially as follows:

War Department:	
Corps of Engineers.....	Navigation. Flood control. Beach-erosion control.
Department of Agriculture:	
Forest Service.....	Soil erosion prevention and run-off and water-flow retardation.
Bureau of Agricultural Economics.....	Land drainage for agriculture.
Soil Conservation Service.....	Small-scale facilities for farmstead and stock-water supply, irrigation and recreation on private lands, and national forest lands.
Agricultural Adjustment Administration.....	
Farm Security Administration.....	
Department of the Interior:	
Bureau of Reclamation.....	Irrigation.
Fish and Wildlife Service.....	Fish life propagation and protection. Wildlife propagation and protection.
Geological Survey.....	Measurement of quantity and quality of surface and underground waters. Hydrologic investigations.
National Park Service.....	Recreation.
Grazing Service.....	Stock-water supply and soil conservation in grazing districts.
Office of Indian Affairs.....	All aspects of water resources on Indian lands.
Office of Land Utilization.....	Soil conservation on lands under the jurisdiction of the Department of the Interior.
Department of Commerce:	
Weather Bureau.....	Measurement of precipitation and evaporation and flood forecasting. Hydrologic investigations.
Federal Power Commission.....	Water power.
Federal Security Agency:	
Public Health Service.....	Pollution abatement (Investigatory). Municipal water supply (Investigatory). Land drainage for public health and comfort (Investigatory).

with coordination in water-planning, including representatives from all the Federal agencies concerned, should comprise one unit in the general coordinating and planning agency.

In the field of water planning the coordinating agency should perform the following functions:

1. To consult and cooperate with other Federal agencies, with States or political subdivisions of States, and with institutions, organizations or individuals, on problems relating to the water resources of the United States.

2. To examine, study, analyze, assemble, and correlate, and at suitable intervals, to review and revise basic information and data relating to the formulation of plans for the conservation, regulation or control, and development and utilization of water resources.

3. To carry on studies for the improvement of existing *techniques* for the investigation of water problems and the development of water plans and programs and for the provision of new techniques for such purposes.

4. To review, in an advisory capacity, the water plans and proposed projects of different Federal agencies or cooperating groups of agencies, to prepare digests thereof, and to transmit such digests, together with appropriate comments, to the President.

5. To carry on studies needed to integrate the investigations of other agencies concerning water resources.

6. To study problems of policy with respect to water resources and, if possible, to recommend desirable and practicable improvements in policy.

7. To prepare, from time to time, in cooperation with all interested Federal agencies, programs of complementary and coordinated investigations and surveys with respect to water resources, and to submit such programs to the President and through him to the Congress for appropriate consideration and action.

8. To formulate, in cooperation with all relevant agencies, and to recommend to the President a practical and progressive plan for the unified regulation and development of the river systems of the United States for all useful and feasible purposes, including any or all of the specific purposes enumerated on page 24 of this report.

9. To recommend the most beneficial sequence (priority classifications) in which the proposed regulatory or developmental works in each such river-system plan may be constructed.

10. To include in each plan proposals for the integrated operation of the regulatory or developmental works included therein, insofar as integrated operation may be deemed feasible and desirable.

11. To revise, in cooperation with the other agencies concerned, such river-system plans from time to time on the basis of new information and data or on the

basis of new needs for the control or use of the waters of the rivers and streams involved.

12. To submit annually to the President and through him to the Congress, construction programs for the prudent conservation, judicious development, and efficient utilization of the water resources of the United States, including programs for carrying out unified river-system plans, as such plans are developed, for executive and legislative consideration, and, in addition, to prepare and submit special reports and recommendations upon appropriate subjects whenever the President or the Congress may request such reports and recommendations, or whenever, without such request, they may seem desirable.

13. To examine all budget proposals for Federal expenditures in the field of water resources, including proposals concerning water projects made in the 6-year programs of public works, in the light of relevant functional and regional relationships and of national water policy, and to advise the Bureau of the Budget with respect to them.

14. To assist, whenever such assistance is desired and practicable, in planning and conducting investigations and negotiations designed to settle, through compact agreements or otherwise, controversies among or between States over their respective rights to the waters of interstate streams.

15. To perform other appropriate duties designed to promote improved planning for the integrated regulation and development of the Nation's water resources in accordance with national water policy.

The coordinating agency performing the functions that have been indicated would not duplicate the normal activities of any other Federal agency, nor should it do so. In order to insure fulfillment of those functions, it is essential that every department and establishment of the Federal Government furnish to the coordinating agency such information, data, and assistance in its possession or at its disposal as the coordinating agency may reasonably require from time to time to perform the duties and services assigned to it, and that the coordinating agency likewise furnish to such departments and establishments upon request appropriate information or data in its possession.

It follows from what has been said that the coordinating agency should not be empowered to design, build, or operate project works or structures.

Programming Projects

Since all projects in a national water plan cannot be built at one time, an orderly program involving priorities is necessary. For nearly a decade, moving 6-year programs of public works, including many water projects, have been prepared annually by Federal agencies in accordance with the Federal Employment Stabiliza-

tion Act of 1931.²⁰ In formulating these programs, substantial progress has been made toward the adoption and use of uniform criteria in rating and timing water projects. In general terms, these principles of action are:

1. To recommend for early construction projects having certainty of benefits that would exceed costs in relatively high degree.

2. To favor projects which provide for all purposes practicable of attainment.

3. To favor projects of relatively large social value to relatively large numbers of people.

4. To expedite projects which are elements of unified river plans or which would later fit properly into such plans when formulated.

5. To give preference to projects that do not conflict with regional, State, or local plans, deferring others until the requisite adjustments in plans shall have been made.

6. To recommend for early authorization by the Congress only projects for the appraisal of which data indispensable to proper action are available.

7. To facilitate projects of present rather than prospective urgency.

8. To give priority to projects that would contribute definitely and significantly to national defense, such as the improvement of strategic harbors for naval use, the development of power sites for special war industries, and flood protection for industrialized valley bottoms whose products are needed for defense.

9. To give preference to projects already authorized by the Congress and particularly to authorized projects that are under way.

10. To expedite completion of meritorious projects under way as rapidly as practicable, consistent with budgetary requirements.

11. To defer projects confronted by legal or other complications that are likely to involve long delay, until such obstacles are removed.

12. To favor projects that would remove or ameliorate conditions which constantly threaten public welfare as against projects that relate to adverse conditions which recur only at long intervals. (In some valleys, for example, heavy stream pollution is a constant menace, whereas destructive floods in them are of rare occurrence.)

13. To recommend simultaneously or conjointly projects which, if undertaken concurrently or in prompt succession, could be built with greater economy in expenditure and greater effectiveness in the use of personnel and equipment than otherwise would be possible.

14. To favor projects the cost of which would be decreased or the utility of which would be increased, or both, by assured complementary action by States or

municipalities on related matters under their jurisdiction. (For example, the need for and cost of flood protection in certain places would be reduced by State and local action in zoning the bottom lands against further hazardous occupation.)

15. To give preference in timing to projects, among those for the construction or operation of which State or local action is needed, that are in States where existing legislation or assured legislation affords a satisfactory legal basis for the undertaking.

16. To give priority to projects, among those necessitating State or local contributions, with respect to which the beneficiaries are likely to meet their obligations fully and promptly. (Expenditures of Federal funds on such projects should be contingent upon State and local fulfillment of responsibility.)

17. To expedite projects that would help significantly to stabilize the economy of problem areas and promote economic rehabilitation in them.

18. To prefer projects which provide for sound readjustment of the economy of populations displaced by the project works.

19. To favor projects that could advantageously utilize relief funds in meeting capital costs and relief labor in reducing unemployment (as, for example, under the provisions of the Wheeler-Case Act).²¹

20. To time meritorious projects in closest possible adjustment to the varying requirements of the public works program, in order to promote the objectives of the Federal Employment Stabilization Act.

21. To favor projects that would help to settle equitably interstate controversies over water.

Obviously, some of the policies or guiding principles that have been enumerated are not applicable to numerous projects. Moreover, a given project may meet some applicable tests in high degree and others only in low degree. The weight that should be given to many of the tests will vary from time to time in a given area and from area to area at a given time. The relevant qualifications to be tested present themselves in numerous combinations. Projects of dissimilar character may not be comparable on any satisfactory basis. No rigid formula for the determination of priorities in importance or in time is possible. It is impracticable and undesirable, and doubtless will continue to be so, to assign absolute priorities to projects for the country as a whole, for regional groups of drainage basins, or in many instances even for individual basins. For all these reasons, the task of effective programming is complicated and difficult.

The best attainable results in programming projects can be secured only through close collaboration among the Federal agencies charged with the investigation of

²⁰ Act of February 10, 1931, 46 Stat. 1084; 20 U. S. C. 48 et seq.

²¹ Act of August 11, 1939, 53 Stat. 1418; 16 U. S. C. 590y et seq. as amended by the act of October 14, 1940, Public, No. 848, 76th Cong.

special water problems (pollution, floods, navigation, etc.), and concerned with special plans for the solution of such problems. If such collaboration is to be general, continuous, effective, and consistent with a unified national water policy, there must be additional specific provision for it. The recommendations of the cooperating agencies concerning programs and priorities are now submitted,²² of course, to the Bureau of the Budget and the National Resources Planning Board jointly for consideration from budgetary and planning points of view.²³ Since 1921, the Bureau of the Budget has passed in effect on all aspects of project priority in its preparation of the annual Federal Budget. The final decision with respect to priorities rests with the Congress through the process of authorization and appropriation. The proposals made here are intended to facilitate the work of both the Bureau of the Budget and the Congress.

Financial Policy

Two analytically separate functions, often confused, should be distinguished carefully in considering the financing of water projects. One is the *advance of capital* for project construction in the first instance; the other is *repayment*, or the ultimate provision of project costs, including both capital charges and costs of operation and maintenance. While the two functions are sometimes combined in a single action, notably by the Federal Government in paying the entire cost of certain navigation or flood-control works without provision for repayment (in which case the ultimate burden falls on the Federal taxpayer), they need not be performed and often are not performed by the same agency or political unit.

Equitable division of costs among project beneficiaries, no less than valid appraisal of the desirability of projects, depends upon explicit and consistent definition and evaluation of benefits and costs. All possible improvement, now and later, in methods of evaluation is a necessary prerequisite, therefore, to sound financial policy.

Evaluation of Benefits and Costs

Methods of evaluation have grown up in haphazard and unrelated fashion. Each agency involved has developed its own criteria of benefits worthy of consideration, its own systems of cost determination. Methods differ not only as between different functions; they also differ markedly and frequently as between different agencies dealing with the same function. Such discrepancies and contradictions become particularly

striking when multiple-purpose projects bring into juxtaposition dissimilar methods for the various functions involved.

Present Practice: Benefits.—Present evaluation techniques applied to benefits are seriously inconsistent. In the field of *navigation*, benefits are variously estimated as equivalent to rate savings on expected traffic compared with existing rail rates, rate savings compared with rail costs, the maximum possible yield from tolls if tolls were charged, or the actual expected revenue from tolls postulated at various levels. Calculations of *flood-control* benefits rest upon average annual flood damages in the past, estimated annual flood damages based upon the development in the flood plain, increments in property values ascribed to the avoidance of flood risk, savings in cost of alternative protection works, or upon some combination of these factors. *Power* benefits are commonly evaluated at the cost of the cheapest alternative means of supplying equivalent service. They are sometimes considered, however, merely as the savings to consumers under various projected rate schedules, and sometimes as the value to consumers in terms of increased incomes made possible by electrification. *Irrigation* benefits are generally based upon the increased value of crop yields attributable to the control of water or to the supply of additional water. *Domestic water-supply* benefits may be placed at the highest possible sales price, the actual sales price expected at various rate levels, or the cost of the cheapest alternative means of supplying the equivalent service. *Secondary benefits*, including unemployment avoidance, and intangible benefits such as recreation, national defense, wildlife conservation, economic rehabilitation, and the like, are either not evaluated at all, or values are placed upon them by a variety of expedients.

Present Practice: Costs.—Evaluations of cost for purposes of project justification present fewer difficulties and fewer anomalies in practice than do evaluations of benefits. Inadequate consideration has been given however, to indirect costs. Striking variations also occur with regard to three elements of direct and tangible costs. (1) Allowance for *interest* on capital is made for most purposes, but not for irrigation under the policy consistently followed by the Congress since the passage of the National Reclamation Act of 1902.²⁴ (2) Variations in annual cost calculations are produced by the selection of differing periods of *amortization* for water projects, none whatever being provided in some cases. The most common period is 40 years, although in the case of the Boulder Canyon project,²⁵ a 50-year period was allowed. (3) Finally, no consistent policy has yet been established with regard to payments to States and localities in lieu of taxation.

²² Under the terms of the Federal Employment Stabilization Act of 1931 (46 Stat. 1084; 29 U. S. C. 48), all Federal construction agencies have since 1932 submitted 6-year programs of proposed public works.

²³ Executive Order No. 8455, dated June 26, 1940.

²⁴ 43 U. S. C. 372, et seq.

²⁵ Boulder Canyon Project Act, 45 Stat. 1057, 43 U. S. C. 617 et seq.

This variety in the evaluation techniques applied to benefits and costs is based in part upon variance in fundamental assumptions. The use of alternative cost avoidance as a measure of benefits, for example, presupposes precise equivalence between the benefits and the costs of the alternative. Yet the alternative may not be economically justifiable,²⁶ since its benefits may be smaller than its cost. Similarly they may be larger. Some independent criterion of the volume of benefits is essential. In the flood-control field, likewise, if both average annual damages and land-value increments are included in the calculation of benefits, a substantial element of duplication may be involved.

Evaluation of relatively intangible, but none the less real, benefits and costs presents problems of peculiar difficulty. Recreation, national defense, a strengthened national economy, and the secondary benefits of unemployment avoidance and economic stabilization are all measurable only with great difficulty. Yet failure to attach any value to them is in practice equivalent to their evaluation at zero, which is clearly unwarranted. In the matter of recreation the interested agencies are developing methods of evaluation. National defense involves two types of considerations: (1) the contribution to it of any strengthening of the economy, which does not require separate evaluation, and (2) works with direct military or naval utility, with respect to which the judgment of appropriate authorities concerning the extent of justifiable expenditure must be taken as conclusive. If power or navigation facilities are developed more rapidly than otherwise would be appropriate, in order to provide a reserve of capacity for defense purposes, only the difference between the normal cost and the cost of the accelerated undertaking need be attributed to national defense. The justifiability of this expenditure must also be determined by the defense agencies.

With these considerations in mind, it is recommended that:

1. In seeking to resolve the present contradictions in methods of evaluating benefits, survey agencies should take as their guide all the values, monetary and non-monetary, of a project to all its beneficiaries, both public and private. These may be measured in most instances in terms of increases in net economic and social income due to project operations. Such increases may take the form either of enlarged revenues or enhanced opportunities (as, for example, from increased crop

yields because of additional irrigation water, from enlarged returns on agricultural products made possible by electric refrigeration, or from improved recreational facilities) or of decreased costs (such as savings in transportation rates, in costs of power, or in cost of repairing flood damages). Cooperative studies should be undertaken or continued by the agencies to develop consistent and explicit procedures and techniques for applying this principle to specific water purposes. In order to give to each agency the benefits of the experience of other survey agencies, the national coordinating agency should ensure regular exchange of information in this field and provide such counsel and advice as may be possible.²⁷

Particular attention should be given to the development of standard methods of social accounting to provide reasonable bases for the evaluation in dollar terms of intangible and indirect benefits and costs.

2. Allowance for interest should always be included in the evaluation process, *whatever the policy toward ultimate repayment of project costs*. Only in this way can valid comparisons be made among different types of projects and among projects with varying lengths of life. As long as interest must be paid by the Government on borrowed funds, it is a real cost which should be attributed to the project. At the survey stage, the allowance for interest should be made at the average rate on long-term Government obligations issued during a recent period. This rate should be adjusted later to conform with the weighted average rate on long-term Government securities issued during the period of construction.²⁸ Allowance should also be made for interest during construction at the estimated actual burden.

3. In general, the period of amortization should be set as nearly as practicable at the estimated useful life of a project. Possibilities of unforeseeable developments in the future, including technological changes, make it wise to fix a maximum period which may be shorter than the anticipated physical life of water projects, as an allowance for obsolescence. In some countries public enterprises have provided in certain instances for periods as long as 90 or 100 years, as in the case of the London Passenger Transport Board's subway extensions. It is recommended that 60 years be adopted as the *maximum* period for the evaluation of water projects in this country. In many instances, a substantially shorter period may properly be used.

4. Wherever practicable, allowance should be made for reasonable payments to States and to local au-

²⁶ As an example, the report of the Tennessee Valley Authority on "Value of flood height reduction from TVA reservoirs to the alluvial valley of the Lower Mississippi River," *Technical Monograph No. 45*, at pp. 21-26, includes as a benefit the difference, amounting to \$10,550,000 between railroad relocation costs at present flood heights, estimated at \$23,350,000, and corresponding costs with a two-foot reduction, estimated at \$12,800,000. This method can reasonably be employed only on the assumption that relocation at \$23,350,000 would itself be warranted. To determine its justifiability an independent appraisal of relocation benefits is necessary. Such an appraisal (perhaps based on reconstruction costs in the absence of relocation) might show a figure either larger or smaller than \$23,350,000.

²⁷ In this connection see National Resources Committee, *Public Works Planning*, 1936, pp. 137-179.

²⁸ Application of this principle to the Boulder Canyon project would have avoided the necessity for legislative action in 1940 to reduce the statutory interest rate from 4 to 3 percent. (Public, No. 756, 76th Cong.)

thorities in lieu of taxation, with a view to avoiding hardships or discrimination.²⁹

Advance of Capital

Policy toward the advance of capital has also developed without systematic consideration of the desirable location of the banking function. Where the Federal Government has contributed a substantial part of the ultimate cost, it has ordinarily advanced this amount through lump-sum appropriations without provision for repayment. The first general flood-control legislation, that of 1936,³⁰ provided for a capital contribution by State or local interests of lands, easements and rights-of-way needed for project construction; this requirement was waived in 1938,³¹ however, with respect to dams and reservoirs, channel improvements, and channel rectifications. In the emergency period of the last decade, the relative weakness of State and local credit structures, coupled with the Federal policy of stimulating public works as a means of reducing unemployment and promoting economic stabilization, led to large-scale extension of Federal credit for water projects that were local in scope. This process was accomplished in part through loans and grants by the Public Works Administration, the Work Projects Administration, and their predecessors, and in part through the Reconstruction Finance Corporation.

Federal agencies have sometimes conflicted in their policies toward the assumption of this banking function. Thus, in reporting recently on a proposed multiple-purpose project in the San Luis Valley in Colorado, the Corps of Engineers recommended local lump-sum contributions to the original cost, while the Bureau of Reclamation, in accordance with its statutory authority, recommended that all the expenditures chargeable to irrigation be advanced by the Federal Government.

It is recommended:

1. That the Federal Government be ready to advance capital for the construction of all projects in which a substantial national interest is involved. Such a national interest presumably inheres in all projects toward which the Federal Government under the principles proposed in the next section will contribute part of the ultimate cost, and also in projects that are local in scope but represent furtherance of a region-wide or Nation-wide policy, such as rural electrification and provision of small water facilities. In periods of business depression, when many projects are constructed with a view to their secondary stabilizing effects as well as to their primary benefits, the use of Federal credit should be extended to all types of meritorious local projects.

Readiness of the Federal Government to advance credit does *not* imply, of course, that it must or should do so for all projects or at all times. It should not do so, for example, for projects inconsistent with national policy. Where the appropriate State or local agencies are financially sound, and desire to operate local projects without the supervision necessarily associated with Federal financing, decentralization of the banking function should be encouraged if it be consistent with the public interest from all relevant points of view. Ordinarily, however, Federal credit will obtain a saving of one percent or more in the interest rate, a sizable amount where capital charges are a large share of the annual burden. The interstate character of most drainage basins and the benefits which accrue to the Nation as a whole from wise use of its water resources make it appropriate for the National Government to supply this banking service as its normal minimum contribution.

2. That there be promoted joint participation in the advance of capital, particularly where contributions can be made in kind (as with land or rights-of-way). When a State or local authority is already in possession of the land such contributions may avoid difficult valuation problems in the course of condemnation and simplify the negotiation of repayment contracts. On the other hand, if the State or local unit must float its own securities (either revenue bonds or general taxation bonds) an element of rigidity may be produced in the repayment procedure which can be avoided by Federal financing. Where a judicious program for variation of the annual repayments in conformity with the beneficiaries' income has been established, as under the Reclamation Project Act of 1939,³² Federal rather than local advance of capital is preferable.

If joint State-Federal corporations are adapted to the development of water projects (see p. 39), the various political units could participate in the advance of capital through subscriptions to corporation stock in proportion to the predetermined obligations for repayment.

3. That in the case of large projects operated by specialized Federal agencies, Federal advance of capital through direct Congressional appropriation be maintained in most instances as at present. Administration by arms of the Federal Government, subject to the usual fiscal controls, should suffice to protect the reimbursable portion of the Federal investment.

Federal credit may be extended to State and local operating agencies, or to State-Federal public corporations, either by guarantee of revenue bonds or the general securities of water-development corporations, or by lending Federal funds (obtained either from Congressional appropriations or from borrowings on

²⁹ A study is in progress under authority of Executive Order No. 8034 of January 14, 1939, with a view to recommending a policy in this field.

³⁰ Act of June 22, 1936, 49 Stat. 1571; 33 U. S. C. 701c.

³¹ Act of June 28, 1938, 52 Stat. 1215; 33 U. S. C. 701c-1.

³² Act of August 4, 1939, 53 Stat. 1187; 43 U. S. C. 485 et seq.

the market by the Federal lending agency). This function may well be combined with the provision of expert administrative and accounting services by the Federal lending agency to local project administrators.

Repayment of Costs

As a general principle costs should be repaid as far as practicable by the beneficiaries, with due consideration for the amounts of benefits received. To this principle there will be two qualifications in accordance with national policies adopted by the Congress: provision of special aid to economically distressed areas (which, of course, will vary) and special aid to depressed social groups.

Recommendations should be made at the planning stage of any large project for the distribution of its ultimate cost among Federal, State, and local political units, and the appropriate groups of private beneficiaries. On multiple-purpose projects, provision should likewise be made in advance for the allocation of joint costs among the several purposes. Such cost distributions cannot be based upon inflexible formulas applicable to every type of project. A considerable degree of judgment will be required in each case. Likewise, it may be necessary to make changes in cost distribution in order to meet unforeseeable conditions, such as general or local economic depressions.

The ultimate determination of willingness to assume a fair responsibility for national, State, or local benefits must depend in the final analysis upon the governmental process operating through the Congress, State legislatures, and representative local public bodies. None the less, guiding principles are not only possible in this field, but they are also essential to sound and prudent investment and to the avoidance of unwarranted raids upon the Federal Treasury.

Distribution of Cost Repayments.—Vendible services, which may be sold unit by unit to beneficiaries, present no serious problem. Difficulties arise, however, both with tangible but nonvendible services and with intangible benefits. Sound policy requires a statement for each major water function of the basis upon which Federal contributions may be warranted by the national interest. To promote clarity in this process, accounting and reporting procedures should be so set up as to reveal for each project of every functional type the extent of contribution from each source. For example, the Federal contributions in the form of advances of interest-free capital should be shown in the project accounts. Public documents describing the economic structure of navigation projects should state the full cost of development. Indirect as well as direct costs should be evaluated and clearly presented.

Present practice in regard to the distribution of cost repayments may be summarized as follows:

(a) *Flood control.*—In principle, the Congress has required the division of flood-control costs between the Federal Government on the one hand and direct State and local beneficiaries on the other. The Mississippi Valley flood-control policy adopted in 1928³³ placed the burden of subsequent protection in the valley wholly upon the Federal Government, on the ground that local interests already had contributed their share. The first general flood-control act, enacted in 1936,³⁴ required local contributions of lands, easements and rights-of-way, up to half the total project cost. This requirement was abandoned in 1938³⁵ with respect to dams and reservoirs, channel improvements, and channel rectifications, and is now practically limited, therefore, to the construction of levees and floodways. In administrative practice, the Corps of Engineers sometimes recommends greater local contributions where direct and highly localized benefits appear clearly to warrant that procedure.

Under the War Department Civil Appropriation Act, 1938,³⁶ reservoir capacity may be increased to provide domestic water or other conservation storage in addition to flood-control storage provided the local contributions suffice to pay the additional cost. As a condition of Federal expenditures for run-off and waterflow retardation and soil-erosion abatement in connection with flood-control programs, the Secretary of Agriculture may require "contributions in money, services, materials, or otherwise to any operations conferring such benefits."³⁷

(b) *Navigation.*—Existing river and harbor development policy places upon the general public the full burden of improvement and maintenance except for the provision in many instances of lands and rights-of-way. No guide to an appropriate division of costs among Federal, State, and local units has been adopted by the Congress. The Chief of Engineers, in making reports upon proposed improvements, is required to state the expected local benefits and to recommend an appropriate degree of local cooperation. Such cooperation in the past has applied chiefly to the provision of lands, rights-of-way, and terminals. Recoupment of any part of the capital costs from users through the assessment of tolls has not been attempted in recent history.

(c) *Irrigation.*—On irrigation projects constructed by the Bureau of Reclamation, Congressional policy since 1902, when a revolving Reclamation Fund was established, has required the repayment of costs by the water users in periods increased from time to time from 10 to 40 years (with the addition, since 1939, of a developmental period not to exceed 10 years in length but

³³ Act of May 15, 1928, 45 Stat. 534, 33 U. S. C. 702a.

³⁴ Act of June 22, 1936, 49 Stat. 1570, 33 U. S. C. 701a et seq.

³⁵ Act of June 28, 1938, 52 Stat. 1215; 33 U. S. C. 701c-1.

³⁶ Act of June 19, 1937, 50 Stat. 518; 33 U. S. C. 701h.

³⁷ Act of August 28, 1937; 50 Stat. 877; 33 U. S. C. 701c.

free from interest. When a project is financed from the general fund the effect of this policy is a Federal contribution of, roughly, 40 to 50 percent, depending upon the interest rate assumed. For irrigation of Indian lands, reimbursement without interest is required from non-Indian occupiers, but no reimbursement from Indians. Costs of operation and maintenance of irrigation projects are paid by the water users.

(d) *Water Power*.—Consistently adopted policy on Federal projects involving power provides for rates sufficiently high to repay, over a designated period and with interest, at least the full cost of the power facilities and an appropriate share of the facilities used jointly for several purposes. In the case of the Boulder Canyon Project Act of 1928³⁸ the power rates originally established would, if maintained, have repaid virtually the entire capital cost, despite the contribution of the dam to flood control, irrigation, and domestic water supply. Other instances could be cited, notably the Kendrick project in Wyoming, in which users of power are charged with part of the cost even of separable facilities devoted to other purposes.

(e) *Public water supply; pollution abatement; land drainage*.—In these fields long-established policy has placed the responsibility for action upon State and local political units. The responsible public bodies usually have recouped the costs of water supply from consumers. Federal activity ordinarily has been restricted to technical advice and to aid in financial organization. During the recent depression, assistance has included loans and grants through the Public Works Administration, relief labor through the Work Projects Administration, and direct work by the Civilian Conservation Corps, primarily with a view to promoting economic stabilization.

(f) *Soil conservation; small water facilities; beach erosion; recreation; wildlife conservation*.—In each of these fields the Congress has recognized a considerable degree of Federal interest. The Soil Conservation Act of 1935³⁹ and the Water Facilities Act of 1937⁴⁰ both authorize the Secretary of Agriculture to require State or local contributions as a condition of Federal action. The Beach Erosion Board established in the War Department in 1930 is required to report on the extent of the Federal interest in erosion control.⁴¹ National obligations in providing recreational facilities and promoting wildlife conservation have been assumed through the creation of the National Park Service and the Fish and Wildlife Service (formerly the Bureau of Fisheries and the Bureau of Biological Survey). No clear guiding principles have been established, however, for deter-

mining proper cost distributions among Federal, State and local beneficiaries.

The past has provided no definite policy to guide the extent of Federal contributions, either as among different purposes or as among different projects with the same purpose. It is recommended: (1) that Federal contributions be limited to amounts proportionate to the estimated national benefits involved,⁴² (2) that State or local contributions, or both if appropriate, be required where practicable as a regular policy on all projects where localized benefits demonstrably exist, (3) that suitable techniques be devised for the assessment of private beneficiaries for a fair proportion of the cost of nonvendible benefits, and (4) that charges for vendible benefits be made with due regard for the volume of the benefits. To these ends, as to others of comparable importance, it is recommended that provision be made for the implementation of a definitive water policy by cooperative action of the various interested Federal, State and local agencies and the national coordinating agency.

Allocation of Joint Costs of Multiple-Purpose Projects.—With the attention given in recent years to multiple-purpose projects, the significance of the problem of an equitable allocation of joint costs has been increasingly realized. Although the Congress has directed the making of allocations in three instances, the Tennessee Valley Authority Amendment Act of 1935,⁴³ the Bonneville Project Act of 1937,⁴⁴ and the Fort Peck Project Act of 1938,⁴⁵ and has provided them in more general terms under Section 9 of the Reclamation Project Act of 1939,⁴⁶ the statutes give no hint as to the method to be used. Various allocation methods have been proposed and their merits argued with fervor. Many economists hold that any method is arbitrary.

In the past, the commonly used devices have depended (1) upon an attempt to apportion the physical facilities by their use, (2) upon the value of the benefits estimated to be obtained from the respective purposes, (3) upon the estimated cost of performing each purpose singly, (4) upon a combination of these various methods, or (5) upon a purely arbitrary apportionment, sometimes in equal parts, to as many purposes as were involved. After elaborate consideration of various possibilities, the Tennessee Valley Authority used the

³⁸ In periods of business depression the attendant benefits of unemployment avoidance and economic stabilization will warrant additional Federal contributions. Unemployment avoidance may be viewed either as a Federal benefit equivalent to the saving in relief expenditures or as a cost reduction made through the allocation of relief funds. The Wheeler-Case Act of 1939 (Act of August 11, 1939, 53 Stat. 1419; 16 U. S. C. 590y, 590aa) provided specifically for the use of Work Projects Administration funds in this manner for water conservation and utilization projects in the Great Plains and the arid and semiarid areas of the United States.

³⁹ Act of August 31, 1935; 49 Stat. 1077; 16 U. S. C. 531m.

⁴⁰ Act of August 20, 1937; 50 Stat. 731; 16 U. S. C. 832.

⁴¹ Act of May 18, 1938, 52 Stat. 403; 16 U. S. C. 833.

⁴² Act of August 4, 1939, 53 Stat. 1193; 43 U. S. C. 495h.

³⁸ Act of December 21, 1928, 45 Stat. 1057; 43 U. S. C. 617 et seq.

³⁹ Act of April 27, 1935, 49 Stat. 153; 16 U. S. C. 590a et seq.

⁴⁰ Act of August 23, 1937, 50 Stat. 869; 16 U. S. C. 590r et seq.

⁴¹ The Beach Erosion Act, as amended, Act of July 3, 1930, 46 Stat. 945; 33 U. S. C. 426, has been administratively interpreted to limit the expression "Federal interest" to erosion affecting Federal properties, rather than a possible broader national interest in general erosion control.

so-called "alternative justifiable expenditure" theory.⁴⁷ Under this principle, joint costs were allocated in proportion to the separate costs of alternative one-use systems, less the separable costs assignable to each use. The method was adopted without any claim for its universal applicability or its theoretical invulnerability. It is defective, as recognized by its proponents, in premising the justifiability of the alternative cost. Such justifiability can depend only upon an independent evaluation of the benefits; they may, in fact, be either more or less than the cost of a single-use project. Proper use of this method would depend, therefore, upon a prior independent appraisal of benefits, which should be assayed in any case as a basis for testing the soundness of the project and for distributing its costs. Allocation based on an apportionment of physical facilities is impracticable in most instances. A given storage space may be used simultaneously for two purposes. Moreover, the procedure erroneously assumes that an equal volume of storage space, or an equal volume of water, is equally valuable for all purposes. It also fails to distinguish between consumptive uses, such as irrigation and domestic water supply, and uses which do not substantially lessen the available supply (although sometimes necessitating treatment before further use), such as the generation of power and most industrial uses.

Without proposing a rigid formula applicable in all instances, it is recommended that, as the most suitable general guide thus far available in multiple-purpose project allocations, joint costs be allocated among the several groups of beneficiaries in proportion to their benefits from each function, after deducting separable costs for each function.⁴⁸ No allocation formula should prevent the construction of a project the total benefits of which exceed its total cost, and the benefits of which from each function exceed the separable costs for that function.⁴⁹ Departures from the general principle should be justified on their merits in each case.

Charges for Vendible Benefits.—The major products of water development projects which may be sold unit by unit are hydroelectric power, domestic water, commercial water, irrigation water, and navigation facilities. Rate policies in the past, particularly for power, have varied from project to project, depending upon the supposed primary purpose to which the project was devoted. Navigation facilities have been pro-

vided free of charge. Other vendible benefits are generally sold on a cost basis, with due regard to the competitive situation governing the market.

Sound policy requires that multiple-purpose projects be treated as really multiple in purpose rather than as single-purpose projects with incidental byproducts. Three major considerations will then enter into the formulation of a proper rate policy: (1) repayment of a fair share of the costs, including the properly assignable proportion of joint costs; (2) the most efficient areal distribution of agriculture and industry and the most efficient use of natural and human resources; and (3) wider policies applicable to particular services, such as the use of public competition as a regulatory device. No group of project beneficiaries should be required to support more than a justifiable share of the costs because they consume a vendible service. At the same time, a maximum limit will be set to charges by the cost of an alternative means of supply, if such an alternative exists.

It is recognized that benefits from vendible services and charges made to the users of them are mutually interdependent. As charges increase, the value to a consumer in terms of its effect on his net income decreases. This mutual interdependence does not reduce to a logical circle, however, the distribution of costs and allocation of joint costs under the principles here proposed, since a point can always be found at which the level of charges and consequent level of benefits will be in proper proportion.

In accordance with a previous recommendation by the Water Resources Committee of the National Resources Committee⁵⁰ it is suggested that consideration be given by the Congress to the desirability of charging tolls for the use of waterway improvements, with a view to reimbursing the Government for part of its expenditures thereon, but without precluding promotional rates during a development period, the adjustment of tolls from time to time to changing conditions, or the treatment of a river system as an entity with respect to tolls. Ultimate decision on this matter obviously will rest no less upon national transportation policy than upon national water policy.

It is recommended that power rates be fixed primarily with a view to returning a justifiable share of the project costs. While in special instances of extremely low-cost hydroelectric development it may be desirable to place charges upon a somewhat higher level than would be suitable otherwise, failure in general to fix rates upon a cost basis sacrifices the natural advantages of particular regions and tends to impair the most efficient use of the natural resources of the Nation. If competitive market conditions prevent rates sufficient to cover

⁴⁷ *Investment of the Tennessee Valley Authority in Wilson, Norris, and Wheeler Projects*, H. Doc. 709, 75th Cong., 3d sess.; *Report of the Joint Committee Investigating the Tennessee Valley Authority*, S. Doc. 56, 76th Cong., 1st sess. pp. 153-161.

⁴⁸ Cf. National Resources Committee, *Public Works Planning*, 1936, pp. 151-179.

⁴⁹ The term "benefits" is, of course, intended to include all the types of benefits discussed on page 26. A formula is essential for accounting and evaluation purposes in order that all concerned may know just what groups benefit and how much; even though the question of how much, if any, of the costs thus allocated are in fact to be repaid by any group of beneficiaries still remains a matter of public policy.

⁵⁰ National Resources Committee, *Drainage Basin Problems and Programs: 1957 Revision*, 1958, p. 97.

entirely the desirable share of joint costs, while permitting recovery of more than the mere separable costs, then rates should be set as high as the primary consideration of full project use will permit.

With regard to water for irrigation, it is recommended that the principle of repayment of a proper share of the project costs be maintained. The desirability of altering the degree of Federal contribution implicit in the interest-free advance of capital should be considered in the light of an appraisal of all irrigation benefits, intangible as well as tangible.

Where vendible benefits pass through the hands of one or more intermediaries before reaching the ultimate consumer, provision should be made against absorption by middlemen of an undue share of the benefits. Avoidance of speculation in power is no less desirable than avoidance of speculation in land, provision against which was made by statute in connection with the Grand Coulee project.⁵¹ Even with retention of the established policy of preference for public agencies and co-operatives in the distribution of power, sufficient protection does not always exist against discrimination among groups of consumers and against cutthroat interregional competition. A degree of resale rate control should be exercised, therefore, by an appropriate regulatory agency dealing with rates in terms of broader national policy.

Assessment of Costs for Nonvendible Benefits.—Where part of the cost of providing nonvendible benefits is placed upon State and local political units, suitable arrangements should be made in advance for their contributions, either on a contractual basis or through sharing in the original advance of capital. Administrative devices for combining financial cooperation with cooperative operation of water projects are suggested on the next page.

For assessment of costs of nonvendible benefits upon private beneficiaries, reliance must be placed upon the States. The Federal Government is without authority to levy direct taxes (other than income taxes) except in proportion to the entire population. On the other hand, fruitful experiments have been made by States and municipalities in assessments for sewage disposal and certain other special purposes; such techniques were applied successfully on a large scale in the Miami Conservancy District scheme for flood control established under the Ohio Conservancy Act of 1914.⁵² The establishment of special quasi-political assessment districts and of quasi-corporate groups of beneficiaries (such as water users' districts and Rural Electrification Administration cooperatives) affords other examples of practicable methods of reaching special beneficiaries while avoiding the impolitic consequences of direct contrac-

tual relationships between the Federal Government and individuals.

It is recommended that all available techniques be explored thoroughly, with a view to appraising their relative advantages and disadvantages, and that every effort be made by methods of superior merit to assess upon special private beneficiaries an appropriate share of project costs. In particular, effort should be made to obtain a fair share from irrigation beneficiaries other than the water users.

Flexibility in Repayment.—Where the incomes of beneficiaries are subject to marked fluctuations from causes beyond their control, the Federal investment will be safeguarded best by provision in repayment contracts for flexibility to make allowances for such fluctuations. Only in this way can recurrent pressure for moratoria and debt reductions be avoided. The provisions of section 4 of the Reclamation Project Act of 1939,⁵³ although not yet tested in practice, promise to afford an excellent model in this respect. While the need for flexibility is most urgent in rural areas, similar provisions may well be devised for urban contributions, public or private, in accordance with general economic conditions in the localities concerned.

If, after a number of years, experience indicates that project benefits have been overestimated or costs underestimated, repayment charges should be adjusted accordingly. Such adjustments should never be so made as to threaten full utilization of the project. Once a project is built and the investment made, the primary object of policy should be its fullest use.

Procedure After Debt Extinguishment.—Several possible procedures after debt extinguishment present themselves. They include: (1) reduction of charges to cover only operation, maintenance, and replacement; (2) maintenance of charges with contributions out of the surplus to a fund for new projects; and (3) maintenance of charges and coverage of the surplus into the general Treasury.

Since continuance of the useful life of a project beyond the period of amortization may reflect an original underestimate of the useful life, some reduction in charges seems warranted where that is true. On the other hand, partial maintenance of charges and coverage of the surplus into a water development fund or into the Treasury may be warranted for various reasons. It is recommended, therefore, that appropriate procedures be devised in this connection after thorough consideration of all of the above-mentioned desiderata.

Financial Control.—Appropriate supervisory procedures over the financial administration of water projects should be developed, where lacking, with a view to

⁵¹ Act of May 27, 1937, 50 Stat. 208; 16 U. S. C. 835.

⁵² Cf. National Resources Committee, *Public Works Planning*, 1936, pp. 202-204.

⁵³ Act of August 4, 1939, 53 Stat. 1180; 43 U. S. C. 485c.

protecting Federal investments in them. If operation is turned over to local interests, Federal audits should be made as long as a Federal financial interest remains unreimbursed. At the same time, an appropriate Federal agency, presumably the lending authority, should aid operating authorities in their financial administration by providing skilled technicians on a reimbursable basis.

Clarity in financial operations demands the adoption of uniform accounting methods and systematic reporting, both of which have been seriously deficient in the past. Provision should be made for the establishment of such methods where they are not already in use, by agreement among the agencies concerned, with the assistance of the national coordinating agency. Each operating authority should publish as part of its annual report a comprehensive balance sheet and operating account showing clearly the financial status of each large project or each group of small projects under its control.

Construction and Operation

Construction

Federal agencies have adequate authority to cooperate with one another in order to promote efficient construction of water projects. Any of them may use the services of other agencies on a reimbursable basis under the provisions of the Economy Act of 1932 and other statutes.⁵⁴ One agency may transfer full responsibility for building water-control works to another better-qualified agency, or responsibility may be shared by two or more agencies. Accordingly, no major changes are recommended in present policy affecting direct construction operations.⁵⁵

One important improvement should be made in the preparatory phase of construction operations which relates to the acquisition of lands. A substantial part of the estimated cost of water projects included in the current 6-year plans of Federal agencies is allocated for purchase of lands, compensation for damages, and acquisition of rights-of-way. In the eastern States, these items account for as much as 60 percent of the total construction cost of some reservoir projects.⁵⁶ Once the acquisition of reservoir lands is initiated, the Federal Government in many instances faces prolonged and expensive proceedings to obtain title to the lands. Recent costly improvements on the lands that are needed may have been made by private owners, by county or State authorities, or even by a Federal

agency.⁵⁷ The social costs of displacing the inhabitants of the reservoir area may be heavy and far reaching.

Construction might be expedited, the total costs, direct and indirect, Federal and non-Federal, would be reduced in many instances, and undesirable social dislocation would be minimized if lands on the sites of proposed reservoirs were acquired as soon as the probable need for them became definitely established, that is, as far in advance of construction as practicable. It is recommended that the Congress enable appropriate agencies of the Federal Government to follow the line of action indicated, and that it strengthen, where necessary, their powers of acquisition. Lands required for water resources development should be acquired and managed by the United States at a rate and by a means designed to prevent waste and unduly abrupt displacements of people and movable property. The acquisition program should be guided by the policies recommended by the Land Committee of the National Resources Planning Board,⁵⁸ and should be linked with rural-rehabilitation activities intended to aid in resettlement of people and readjustments in land use.

Operation

Old Ways and New Needs.—Numerous maladjustments between old ways and new needs inevitably develop when a long period of small, simple, unrelated, and relatively inexpensive water projects draws to a close and a period of large, complex, interrelated, and costly projects opens. Such a transition from old conditions to new conditions is now in progress and such maladjustments already abound. Policy and procedure should be adapted to the emerging order not only with respect to the investigations, plans, and programs that must precede wise construction of water projects of the new type, but also with respect to the operation of them after they are built. Looking forward, it is not difficult to envisage a time when the relation of national policy to problems of operation will be a matter of paramount importance in the field of water resources. Various recommendations in earlier parts of this report were influenced accordingly. The emerging problems of tomorrow call for attention today. It will be necessary soon for the Congress to consider policies for the unified operation of large systems of reservoirs and other structures on many rivers.

In earlier days, the operation of a public water proj-

⁵⁴ Act of June 30, 1932, 47 Stat. 417; 31 U. S. C. 686.

⁵⁵ Removal of the present limitation on contract operations appears to be desirable. That limitation is described in the following decisions of the Comptroller General: 18 C. O. 262 (1938), 19 C. O. 544 (1939) and 19 C. O. 702 (1940).

⁵⁶ Examples are: A flood control reservoir in New England, 70 percent; one in Pennsylvania, 55 percent; and the Muskingum group of reservoirs in Ohio, 55 percent.

⁵⁷ For example, federally-aided municipal improvements were made in the town of Sweet Home, Oreg., following an increase in the local lumber industry, within the site which had previously been selected for one of the principal reservoirs for control of floods in the Willamette River.

⁵⁸ National Resources Planning Board, *Public Land Acquisition, Part I, Rural Lands*. 1940, pp. 23-24.

ect related chiefly, if not wholly, to a single purpose such as the maintenance of a navigation channel or the storage, release, and distribution of water for irrigation. Though some projects were large, they were relatively simple in that they involved only one or a few main structures, in many instances only a single channel or reservoir.

Today, the Federal Government is concerned with the multiple-purpose operation of huge works already constructed in the Tennessee Valley, on the Columbia River at Bonneville, and on the lower Colorado River. Other structures, in most instances parts of projected systems of reservoirs, are under way at Grand Coulee on Columbia River, in the Central Valley of California, on tributaries of the Upper Ohio River, on the Connecticut and Merrimack Rivers, the Colorado of Texas and the Brazos, the Grand River in Oklahoma, and elsewhere. These structures are all being built by the Federal Government or with the aid of Federal funds.

In the future, many additional systems of interrelated structures, each involving multiple-purpose operation of most of the component projects and unified operation for several purposes of the system as a whole, will be undertaken. Indeed, many new enterprises of such character are already planned with greater or less adequacy.

Essentials of a Satisfactory Operating Policy.—The engineering phases of the problem of the unified operation of a system of related structures having multiple utility are fairly well known and methods for their solution (doubtless susceptible of improvement) have been devised.⁵⁹ In contrast, plans for administering such a system under public control, with adequate recognition of the various governmental units generally involved, have lagged. Here, especially, determinations of national policy with respect to operation are needed—particularly broad principles of action applicable to dissimilar river basins and to varied circumstances.⁶⁰

A satisfactory operating policy for water will regard each river system as an operating unit with respect to its projects having more than local significance. Administrative control of the unified operation of regulatory and developmental works on most important rivers could not be exercised by a single State, since with few exceptions such rivers traverse or border two or more States. It could not well be exercised wholly by the Federal Government, since recognition must be given to relevant State laws, and since the power to tax the property of local beneficiaries will be needed if they are to share directly in costs. In any event, the States and communities immediately affected by the

operation of the works are entitled to a voice in determining specific policies and procedures to be followed in operating them, in accordance with the American doctrine of government by consent of the governed. The Federal Government should retain, however, a degree of control commensurate with the national investment involved, the national interest in the purposes served, and the national responsibility for the success of the enterprise.

One means of accomplishing these objectives might be the organization of a Federal-State corporation for a given river basin to operate water development and control projects in that area. Subject to general directives set up by the Congress in enabling legislation, to adequate safeguards for the repayment of project costs, and to relevant State laws and interstate compacts, the operating policies of such a corporation would be determined by representatives of the Federal Government and of the several groups of beneficiaries, including State and local political units and organizations, lying wholly or partly within the area. The key to continuing local cooperation and support is local popular control of the distribution function for vendible benefits. In any such corporation, administrative authority and responsibility, as distinct from the power to determine operating policies, would no doubt be concentrated in a competent executive authority.

No definite conclusion has been reached as to whether or not such an organization would be practicable and effective, and no recommendation with respect to it is made at this time. The subject has many facets; it deserves prompt and thorough study.

Regulatory Measures

The recommendations made in earlier sections of this report relate chiefly to Federal participation in planning, constructing, and operating comparatively large water projects. Future control and development of water resources will rest largely upon the success of such projects. There are, however, types of improvements that can be made best by State or local agencies or by individuals acting independently of the Federal Government. Such improvements include municipal provision of water-supply facilities and waste-treatment plants, private construction of small projects, and better practices by water users.

Private interests and public interests in the control and use of water, whatever its source and however it be made available, are not identical in many instances. It cannot be assumed broadly that self-interest will alone dictate the prudent use of water by individuals. It would be unwise to depend upon untrammelled economic forces to bring about the use of water in ways having greatest value. The process would be far too slow and far too costly. Regulatory measures are

⁵⁹ National Resources Committee, *Energy Resources and National Policy*, 1939, pp. 310-313.

⁶⁰ Various types of regional organization are discussed in National Resources Committee, *Regional Factors in National Planning*, 1935.

needed. Such measures are justified by the fact that the supply of water for essential purposes, that on the surface and that underground, is restricted and by the further fact that the future development of large areas is contingent in part upon the extent to which the supply of available water can be conserved and increased. Sooner or later, wasteful use of water must cease.

Regulations designed to curb the wasteful use of water resources and to safeguard the public interest in them must be reasonable, practicable, and consistent if they are to accomplish the objectives in view. They cannot succeed in a democracy without the support of public opinion. An enlightened public opinion can result only from investigation, experimentation, and demonstration by competent agencies and individuals, and the dissemination of established facts and reliable information through all available channels.

No major extension in types of Federal regulation with respect to the local use of water resources is proposed here. In principle, Federal authority should be exercised only if State and local administrations prove clearly unable or persistently unwilling to deal effectively with critical problems of waste and misuse. For the present, at least, additional Federal action in this field should seek especially to promote improvements in State and local regulation.

The present division of regulatory duties among governmental agencies is summarized in Table II. Federal regulations affecting water resources include the maintenance and use of navigable waterways, the licensing of power projects on streams subject to Federal jurisdiction, the inspection of water supplies in interstate commerce, the regulation of certain international streams and lakes in accordance with treaties, and the general supervision of improvements on Federal public lands and Indian reservations. There is little uniformity in the regulatory duties recognized and performed by the various States, counties, and municipalities. Some States have partially adequate statutes and procedures affecting in most respects the water problems within their jurisdiction, but no State has a combination of statutes and procedures that is fully adequate in all respects and many States have neither statutes nor administrative procedures that approach adequacy.

An analysis of State water legislation, particularly as it relates to water rights, is in progress by the Water Resources Committee. Suggestions for specific changes in State laws must await its completion. A few items deserve prompt consideration, however, by Federal administrative agencies and by the Congress. They relate to regulations that would tend to correct well-defined and critical situations inimical to the public interest, that would employ methods each of which has proved effective in two or more States, and that would

safeguard or enhance the utility of Federal expenditures for construction.

1. Provision should be made in the Western States, by establishment of suitable districts with adequate authority, by zoning, or by other appropriate use of the State police power, to limit the irrigated acreage to areas for which there will be a reliable supply of water in years of subnormal precipitation. Otherwise, an expansion of acreage in wet years will lead, as in the past, to a shortage of water in dry years, which in turn will bring crop losses and demands for public assistance in obtaining supplemental water supplies. The sequence of abundant water in wet years, of good crops, optimism, and expansion, followed by insufficient water in dry years, by crop failures, distress, and contraction, may be expected to repeat itself so long as venturesome farmers can act without restraint and with expectancy of Federal aid in providing additional supplies of water when needed. Recent history in the Central Valley of California, the Snake Valley of Idaho, and eastern Colorado warrants such a prophecy. The land-zoning method of control now practiced in Michigan and Wisconsin seems worthy of trial as a means of stabilizing the irrigated acreage in the Western States.⁶¹

2. New land drainage enterprises proposed under State law should be reviewed by a competent State agency to determine whether or not the proposed drainage would promote the most beneficial use of the land. They should be approved or rejected according to the findings, and provision should be made for the economic management of meritorious drainage works after they are constructed. Most persons who plan drainage districts need assistance to avoid unnecessary damage to wildlife, recreational resources, or agricultural interests, and to prevent disadvantageous overlapping of two or more districts. Even well-planned districts soon lose their utility if ditches and drains are allowed to fall into disrepair. Federal financial aid through the Reconstruction Finance Corporation in rehabilitating distressed districts in recent years illustrates in part the need for greater care in planning and organizing new districts. Federal maintenance of ditches or clearance of clogged ditches by use of Civilian Conservation Corps labor may take place even though there is no provision for continued care of such ditches by the local beneficiaries.

3. A qualified State agency should review plans and specifications and issue permits, from the standpoint of safety, for the construction of new dams or other structures in water courses. Experience in Arizona, California, Kansas, and a few other States shows that unless plans for dams are examined and approved by competent engineers from the standpoint of public safety, dangerously weak structures may be built by

⁶¹ Michigan: Laws of 1935, Act 44. Wisconsin: Statutes sec. 59-97.

county officials, corporations, or other individuals interested in controlling stream levels and stream flows.⁶²

4. A State agency should exercise appropriate control over matters related to water pollution, with authority to determine prohibited amounts of polluting substances, to require remedial action by offending polluters, to raise State limits on municipal bonding or taxing powers as a means of procuring funds for building remedial works, and, if necessary, to organize special sanitary districts to finance such works.⁶³ Indiscriminate dumping of deleterious waste into streams, lakes and underground waters should not be tolerated any longer. New pollution detrimental to the public interest should not be permitted. Injurious pollution already in progress should be remedied as speedily as practicable, by reasonable use of the ample police power of the States if necessary.⁶⁴ It is neither practicable nor desirable, of course, to legislate water pollution out of existence. Complete treatment of all waste is far beyond the limit of cost warranted by economic and social considerations. Each instance deserves the special investigation of physical, economic, and social conditions which competent State agencies are best able to make. Additional Federal activity in this field should be limited primarily to investigation, demonstration, and encouragement of appropriate State action.

5. Wasteful flow of water from uncontrolled wells, unauthorized drilling of new wells, and excessive pumping from wells should be prohibited by State laws, and a State agency should be empowered to license wells and to enforce remedial measures. The success attained in administering such restrictions and regulations in New Mexico and Utah has demonstrated their practicability.⁶⁵

6. Construction or alteration of structures (such as buildings, unduly low bridges, and sewer crossings) which encroach on stream channels and which therefore may increase flood hazards should be subject to license by a State agency. Lands in the upper parts of flood plains should be zoned by county or municipal agencies to prevent further uneconomic occupation of them. Flagrant encroachment upon stream channels to build structures which raise the flow line or increase the duration of floods is aggravating progressively an already serious flood hazard in many valleys. The

responsibility for flood protection which the Federal Government is expected to assume in such areas increases correspondingly. Indeed, flood control by reservoirs built by the Government to meet its responsibility may induce further invasion of channels below the reservoirs, and so, if maximum flood flows are not controlled completely, may result in an increase of damage from high flows. New Jersey, Pennsylvania, and Washington have had fairly satisfactory experience, by means of a licensing procedure, in preventing further unwise encroachment upon stream channels.⁶⁶ A few municipalities have zoned their flood plains to prevent uneconomic occupancy hazardous to the public health.

The public interest in these matters is great, and accordingly the Federal Government should promote in every way practicable the adoption of such regulatory measures as those indicated, in forms adjusted fairly to local conditions. The Federal Government invests heavily in the construction or rehabilitation of water projects that yield large local benefits. Without appropriate State or local regulations, Federal investments may be jeopardized. With them, the use of water resources by public agencies and by individuals alike will be greatly improved. It is recommended that this principle of action be incorporated in Federal policy, legislative and administrative, insofar as it has not already been done.⁶⁷

It is recommended further that congressional or administrative action be taken along the following specific lines:

1. Under authorities conferred by the National Reclamation Act of 1902, as amended,⁶⁸ by the Water Facilities Act of 1937, as amended,⁶⁹ and by the Wheeler-Case Act of August 11, 1939, as amended,⁷⁰ or under such additional authority as may be needed, the Bureau of Reclamation and the Department of Agriculture, respectively, should make, wherever desirable, the expenditure of funds for irrigation projects or for the development of relatively large facilities for water storage and utilization contingent upon the enactment of suitable zoning ordinances or the provision of other satisfactory guarantees by the appropriate State or by an appropriate local organization that

⁶² The regulations in those States are described in the following: Arizona, State Engineer Office, *Rules and Regulations Governing Maintenance and Operation of Dams*, Circular No. 2; California, Department of Public Works, *Supervision of Dams*, 1935. Kansas: Ch. 203, Laws of 1929, and Chs. 330 and 332, Laws of 1933. Regulations of all States are summarized in National Resources Planning Board, *Low Dams*, pp. 374-392.

⁶³ Present authorities are summarized in Table II, *infra* p. 93.

⁶⁴ State laws and regulations affecting water pollution are summarized in *Water Pollution in the United States*, H. Doc. No. 155, 76th Cong., 1st Sess. Appendix 1, pp. 89-159.

⁶⁵ New Mexico: 10th sess., Laws, ch. 131, 1931. Utah: Laws 1935, ch. 105, and Laws 1937, ch. 130.

⁶⁶ The regulations in those States are described in the following: New Jersey, State Water Policy Commission, *Information for applicants for permits for construction or alteration of encroachments on streams*, 1938. Pennsylvania Department of Forests and Waters, *Bulletin issued for information of those interested in applications for bridges, walls, fill, etc., under Act of June 25, 1913 (P. L. 555)*, 1936. Washington, State Planning Council, *Flood damage prevention*, 1938.

⁶⁷ The principle is applied in the Maternity Act of 1921 (42 Stat. 224; 42 U. S. C. 161 [repealed]), the Social Security Act of 1935 (49 Stat. 620; 42 U. S. C. 301), the Soil Conservation Act of 1935 (49 Stat. 163; 16 U. S. C. 590a), the Fulmer Act of 1935 (49 Stat. 963; 16 U. S. C. 567a), and the Wildlife Restoration Act of 1937 (50 Stat. 917; 16 U. S. C. 669).

⁶⁸ 32 Stat. 388; 43 U. S. C. 372 et seq.

⁶⁹ 50 Stat. 869; 16 U. S. C. 590 et seq.

⁷⁰ 53 Stat. 1418; 16 U. S. C. 590y et seq., as amended by act of October 14, 1940, Public, No. 848, 76th Cong.

the irrigated acreage will not be extended beyond the limits of reliable water supply in the areas affected by such projects or such facilities.

2. Loans or grants from Federal agencies to public entities for pollution abatement or purposes of municipal or domestic water supply should be made contingent upon the passage of State legislation, if it does not already exist, to provide for reasonable regulation of pollution and of underground waters in the area or areas concerned. Similarly, the financing, in whole or in part, of land-drainage enterprises by the Government should be contingent upon provision for State review of new projects and for the maintenance of operating projects. This procedure may require Congressional action.

3. Federal participation in the cost of major flood-control structures should be contingent upon enactment by the States to be benefited of legislation prohibiting further undesirable encroachment upon stream channels. This procedure would require amendment of the Flood Control Act of 1936,⁷¹ as amended.

The intricate constitutional, statutory, and administrative policies of the several States governing the appropriation of water are omitted from consideration here because, as already stated, they are being analyzed by a special subcommittee on State water law. It is recognized that radical changes in doctrine and procedure with respect to water rights are essential steps toward the proper allocation and use of water in some States, but it is impossible at present to recommend specific changes with assurance of their soundness. Acting always in cooperation with State officials, the Federal agencies concerned with water rights should recognize a continuing responsibility to bring about a judicious determination of desirable and equitable changes in State water-right laws in the light of their mutual relationships with Federal rights and policy.

Summary of Major Recommendations

It is recommended:

1. That it be the declared policy of the Federal Government to: (1) provide for the preparation of plans for the unified regulation and development of the river systems of the country; (2) provide for programs of a definite and effective order of construction of the projects included in such plans, the programs to be prosecuted as rapidly as practicable; (3) provide that programs be made adjustable to the exigencies of unemployment relief in periods of business depression and of defense in times of danger; (4) take proper account of social, general, and potential benefits, as well as economic, special, and existing benefits, in considering specific projects; (5) limit Federal contributions toward projects to amounts warranted by all the national interests involved; (6) provide insofar as practicable for an

equitable distribution of project costs; (7) assist in the settlement of controversies between or among States over interstate waters; (8) provide for systematic and effective cooperation among Federal agencies and between such agencies, and agencies and individuals in the several States in formulating water plans and programs; and (9) eliminate inconsistencies and conflicts between or among existing laws and regulations relating to the control or utilization of water resources—all as set forth in greater detail on page 24.

2. That all Federal agencies which formulate plans for water projects observe the following directions with respect to each such plan, as it takes form, insofar as they are relevant and applicable: (1) each project plan shall provide for all useful purposes practicable of attainment, in the combination which will yield maximum total benefits at minimum total costs; (2) the plan for each project shall take reasonable account of other projects or opportunities for projects which the proposed project may affect or by which it may be affected; (3) the project plan, as an element in a unified river-basin plan, shall take properly into account related conditions outside of the basin; (4) both individual project plans and unified river-basin plans shall make all practicable allowances for shifting conditions by which they may be affected in future; (5) every plan shall seek, above all else, to promote *public interests*; (6) every plan, as a condition of acceptability, shall be economically sound; (7) every plan shall give full recognition to established rights and equitable responsibilities with respect to the waters to be controlled or utilized; and (8) every plan shall conform to a standard financial policy, as adopted by the Congress. These tests of a sound water plan are discussed on pages 24-26.

3. That with respect to water planning, the coordinating agency should perform the following functions: (1) consult and cooperate with other agencies, organizations, and individuals on problems relating to water resources; (2) correlate, review, and revise basic information and data relating to water resources; (3) carry on studies designed to improve techniques or develop new techniques for the investigation of water problems and the formulation of water plans and programs; (4) review in an advisory capacity and make digests of water plans, and transmit such digests with appropriate comments to the President; (5) make studies to integrate, as needed, the investigations of other agencies concerning water resources; (6) study problems of water policy, and recommend desirable and practicable improvements in such policy; (7) prepare from time to time, in cooperation with other Federal agencies, programs of coordinated investigations and surveys of water problems, and submit such programs to the President and the Congress; (8) formulate, in cooperation with other agencies, a practical and progressive

⁷¹ Act of June 22, 1936; 49 Stat. 1570; 33 U. S. C. 701a et seq.

plan for the unified regulation and development of the river systems of the United States; (9) recommend the most beneficial sequence in which the proposed structures in each such river-system plan may be constructed; (10) make proposals, with the aid of other agencies, for integrated operation of regulatory or developmental structures, insofar as such operation be feasible and desirable; (11) revise such river-system plans from time to time, as desirable, in cooperation with the other agencies concerned; (12) submit annual reports and special reports on appropriate subjects to the President and through him to the Congress; (13) examine all budget proposals for Federal expenditures in the field of water resources and advise the Bureau of the Budget thereon; (14) assist in planning and conducting investigations and negotiations designed to settle controversies over the waters of interstate streams; and (15) perform other appropriate duties. This recommendation appears in somewhat expanded form on page 29.

4. That for each major project or group of projects a comprehensive and explicit evaluation be made of all benefits and of all costs. In making such evaluations, survey agencies should: (1) Take as their guide all values, monetary and nonmonetary, of a project to its beneficiaries, both public and private, in terms of increases in their net incomes; (2) adopt consistent methods of social accounting to provide reasonable bases for evaluating in dollar terms the intangible and indirect benefits and costs; (3) make allowance for interest at a rate approximating as closely as possible the actual cost of money to the Government; (4) provide for a period of amortization as nearly as practicable at the estimated useful life of the project, but with a *maximum* of 60 years; (5) make reasonable allowance for payments to States and localities in lieu of taxation with a view to avoiding hardship and discrimination. These considerations are described on page 32.

5. That the Federal Government be ready to underwrite or advance capital for the construction of any sound project in which there is a substantial national interest, and that joint participation in the advance of capital be encouraged, particularly where local contributions can be made in kind and also where provision is made for local participation in administration (p. 33).

6. That costs be paid as far as practicable by project beneficiaries, with due consideration for the amount of benefits received by each group. In particular: (1) Federal contributions should be limited to amounts proportionate to all national benefits, including the attendant benefits of economic stabilization and, in periods of business depression, unemployment avoidance; (2) if practicable, State and local contributions should be required for all projects where localized

benefits demonstrably exist; (3) joint costs of multiple-purpose projects should in general be allocated among the several groups of beneficiaries insofar as practicable in proportion to their benefits from each function, after deducting separable costs for each function; (4) charges for vendible benefits should be fixed primarily with a view to returning a justifiable share of the project costs, subject to the limitations of competing sources of supply and of broader national policy with regard to the service concerned; (5) consideration should be given by the Congress to the desirability of charging tolls for the use of waterway improvements, with a view to reimbursing the Government for part of its expenditures thereon; (6) where services pass through the hands of one or more intermediaries before reaching the ultimate consumer, provision should be made against absorption by middlemen of an undue share of the benefits; (7) private beneficiaries should be assessed their fair share of the costs of nonvendible benefits, including indirect benefits of irrigation to persons other than water users; (8) provision should be made for flexibility in repayment contracts to make allowance for fluctuations in the incomes of beneficiaries arising from causes beyond their control; (9) provision should be made for uniform accounting methods, periodic audits, and systematic reports including publication annually of a comprehensive balance sheet and operating account showing clearly the economic status of each large project or group of small projects (pp. 34–38).

7. That the Congress amend the Flood Control Act of June 22, 1936, as amended, so as to make further Federal contributions toward the cost of flood-control projects conditional upon enactment by the States to be benefited of legislation prohibiting further undesirable encroachment upon stream channels (pp. 40–41).

8. That the Congress authorize Federal financing agencies to make future loans or grants to public bodies for pollution abatement or for purposes of municipal water supply conditional upon the enactment of State legislation providing for reasonable regulation of pollution and of underground waters, in the area or areas concerned, in instances where such legislation does not exist and where, in the opinion of the financing agency concerned, such a stipulation would be equitable and desirable (p. 41).

9. That the Congress make future financial assistance by any agency of the Government to land-drainage enterprises or districts in any State contingent upon provision for State review of new drainage projects and for maintenance of operating projects (p. 42).

10. That the executive departments adjust their policies and procedures insofar as may be necessary and permissible, so as to provide uniformity in rating and timing water projects in accordance with the concepts and criteria stated on pages 29–30.

11. That the Department of the Interior and the Department of Agriculture, acting respectively under existing authority or authority that may be conferred by the Congress, make the expenditure of funds for irrigation projects or for relatively large facilities for water storage and utilization conditional, wherever desirable, upon reasonable State or local provision that

the irrigated acreage shall not be extended beyond the limits of reliable water supply in the areas affected by such projects or such facilities (p. 41).

12. That a study be undertaken to determine the best type of administrative organization for the unified operation of regulatory or developmental works on important river systems (p. 39).

TABLE I.—Legislation Authorizing Surveys of Water Resources by Federal Agencies (See Note 1)

Agency	Function	General authorization for surveys	Specific directives for surveys
War Department: Corps of Engineers.	Navigation.	<p>"Hereafter Federal investigations and improvements of rivers, harbors and other waterways shall be under the jurisdiction of and shall be prosecuted by the War Department under the direction of the Secretary of War and the supervision of the Chief of Engineers, except as otherwise specifically provided by Act of Congress, which said investigations and improvements shall include a due regard for wildlife conservation." (Act of June 20, 1938 (sec. 1), 52 Stat. 802; 33 U. S. C. 540.)</p> <p>"In all cases where preliminary examinations and surveys are authorized a preliminary examination of the river, harbor, or other proposed improvement mentioned shall first be made and a report as to the advisability of its improvement shall be submitted unless a survey or estimate is expressly directed. If upon such preliminary examination the proposed improvement is not deemed advisable, no further action shall be taken thereon without the further direction of Congress; but in case the report shall be favorable to such proposed improvement, or that a survey and estimate should be made to determine the advisability of improvement, the Secretary of War is authorized, in his discretion to cause surveys to be made, and the cost and advisability to be reported to Congress. And such reports containing plans and estimates shall also contain a statement as to the rate at which the work should be prosecuted." (Act of Mar. 4, 1913 (part of sec.), 3, 37 Stat. 825; 33 U. S. C. 545.)</p> <p>"The (Board of Engineers for Rivers and Harbors) shall also, on request by resolution of the Committee on Commerce of the Senate or the Committee on Rivers and Harbors of the House of Representatives, submitted to the Chief of Engineers, examine and review the report of any examination or survey made pursuant to any Act or resolution of Congress, and report thereon through the Chief of Engineers, United States Army, who shall submit his conclusions thereon as in other cases." (Act of Mar. 4, 1913 (part of sec. 4), 37 Stat. 826; 33 U. S. C. 542.)</p> <p>"The surveys of navigable streams . . . shall include such stream-flow measurements and other investigations of the watersheds as may be necessary for preparation of plans of improvement and a proper consideration of all uses of the stream affecting navigation, and whenever necessary similar investigations may be made in connection with all navigable streams under improvement." (Act of June 25, 1910 (part of sec. 3), 36 Stat. 669; 33 U. S. C. 546.)</p> <p>"The Secretary of War, through the Corps of Engineers of the U. S. Army, and the Federal Power Commission are jointly hereby authorized and directed to prepare and submit to Congress an estimate of the cost of making such examinations, surveys, or other investigations as, in their opinion, may be required of those navigable streams of the United States and their tributaries, whereon power development appears feasible and practicable, with a view to the formulation of general plans for the most effective improvement of such streams for the purposes of navigation and the prosecution of such improvement in combination with the most efficient development of the potential water power, the control of floods, and the needs of irrigation: <i>Provided</i>, That no consideration of the Colorado River and its problems shall be included in the consideration or estimate provided herein." (Act of Mar. 3, 1925 (sec. 3), 43 Stat. 1190.)</p> <p>In pursuance of the above authority, House Document No. 308, Sixty-ninth Congress, first session, was published and surveys in accordance therewith were authorized by act of Jan. 21, 1927 (sec. 1), 44 Stat. 1010.</p> <p>Act of Aug. 30, 1935 (sec. 6), 49 Stat. 1048 provides as follows: "That the surveys authorized pursuant to Section 1 of the River and Harbor Act of Jan. 21, 1927, and House Document No. 308, Sixty-ninth Congress, first session, shall be supplemented by such additional study or investigation as the Chief of Engineers finds necessary to take into account important changes in economic factors as they occur, and additional stream-flow records, or other factual data."</p>	<p>"* * * the Board (of Engineers for Rivers and Harbors) shall submit to the Chief of Engineers recommendations as to the desirability of commencing or continuing any and all improvements upon which reports are required. And in the consideration of such works and projects the Board shall have in view the amount and character of commerce existing or reasonably prospective which will be benefited by the improvement, and the relation of the ultimate cost of such work, both as to cost of construction and maintenance, to the public commercial interests involved and the public necessity for the work and propriety of its construction, continuance, or maintenance at the expense of the United States. (Act of June 13, 1908 (part of sec. 3), 32 Stat. 372; 33 U. S. C. 541.)</p> <p>"Provided, that every report submitted to Congress in addition to full information regarding the present and prospective commercial importance of the project covered by the report and the benefit to commerce likely to result from any proposed plan of improvement, shall also contain such data as it may be practicable to secure in regard to the following subjects: (a) The existence and establishment of both private and public terminal and transfer facilities contiguous to the navigable water proposed to be improved, and, if water terminals have been constructed, the general location, description, and use made of the same, with an opinion as to the adequacy and efficiency, whether private or public. If no public terminals have been constructed, or if they are inadequate in number, there shall be included in the report an opinion in general terms as to the necessity, number, and appropriate location of the same, and also the necessary relations of such proposed terminals to the development of commerce. (b) The development and utilization of water power for industrial and commercial purposes. (c) Such other subjects as may be properly connected with such project: <i>Provided</i>, That in the investigation and study of these questions consideration shall be given only to their bearing upon the improvement of navigation, to the possibility and desirability of their being coordinated in a logical and proper manner with improvements for navigation to lessen the cost of such improvements and to compensate the Government for expenditures made in the interest of navigation, and to their relation to the development and regulation of commerce. <i>Provided further</i>, That the investigation and study of these questions may, upon review by the Board of Engineers for Rivers and Harbors when called for as provided by law, be extended to any work of improvement under way and to any locality the examination and survey of which has heretofore been, or may hereafter be, authorized by Congress." (Act of Mar. 4, 1913 (part of sec. 3), 37 Stat. 825; 33 U. S. C. 545.)</p> <p>"The Chief of Engineers, United States Army, shall indicate in his annual reports the character of the terminal and transfer facilities existing on every harbor or waterway under maintenance or improvement by the United States, and state whether they are considered adequate for existing commerce . . ." (Act of July 18, 1918 (part of sec. 7), 40 Stat. 911; 33 U. S. C. 550.)</p> <p>"Every report submitted to Congress in pursuance of any provision of law for preliminary examination and survey looking to the improvement of the entrance at the mouth of any river or at any inlet, in addition to other information which the Congress has directed shall be given, shall contain information concerning the configuration of the shore line and the probable effect thereon that may be expected to result from the improvement having particular reference to erosion and/or accretion for a distance of not less than ten miles on either side of the said entrance." (Act of Aug. 30, 1935 (sec. 5), 49 Stat. 1048; 33 U. S. C. 546a.)</p> <p>"Every report submitted to Congress in pursuance of any provision of law for a survey, in addition to other information which the Congress has directed shall be given, shall contain a statement of special or local benefit which will accrue to localities affected by such improvement and a statement of general or national benefits, with recommendations as to what local cooperation should be required, if any, on account of such special or local benefit." (Act of June 5, 1920 (sec. 2), 41 Stat. 1010; 33 U. S. C. 547.)</p>

TABLE I.—*Legislation Authorizing Surveys of Water Resources by Federal Agencies (See Note 1)—Continued*

Agency	Function	General authorization for surveys	Specific directives for surveys
War Department: Corps of Engineers. Department of Agriculture: Office of Land Use Coordination. Bureau of Agricultural Economics. Soil Conservation Service. Forest Service.	Flood Control.	<p>"All the provisions of existing law relating to examinations and surveys and to works of improvement of rivers and harbors shall apply, so far as applicable, to examinations and surveys and to works of improvement relating to flood control. And all expenditures of funds appropriated for works and projects relating to flood control shall be made in accordance with and subject to the law governing the disbursement and expenditure of funds appropriated for the improvement of rivers and harbors. (Act of Mar. 1, 1917 (part of sec. 3) 39 Stat. 950; 33 U. S. C. 701.)</p> <p>"That, hereafter, Federal investigations and improvements of rivers and other waterways for flood control and allied purposes shall be under the jurisdiction of and shall be prosecuted by the War Department under the direction of the Secretary of War and supervision of the Chief of Engineers, the Federal investigations of watersheds and measures for run-off and waterflow retardation and soil-erosion prevention on watersheds shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture under the direction of the Secretary of Agriculture, except as otherwise provided by Act of Congress; and that in their reports upon examinations and surveys, the Secretary of War and the Secretary of Agriculture shall be guided as to flood-control measures by the principles set forth in Section 1 (see second paragraph in Flood Control "directive" column) in the determination of the Federal interests involved: <i>Provided</i>, That the foregoing grants of authority shall not interfere with investigations and river improvements incident to reclamation projects that may now be in progress or may be hereafter undertaken by the Bureau of Reclamation of the Interior Department pursuant to any general or specific authorization of law. (Act of June 22, 1936 (sec. 2) 49 Stat. 1570, 33 U. S. C. 701b) (reaffirmed in act of June 28, 1938 (sec. 1) 52 Stat. 1215, 33 U. S. C. 701b.)</p> <p>"That, in order to further the declaration of policy and principles declared in Sections 1 and 2 of the Flood Control Act approved June 22, 1936 (see preceding paragraph), and to supplement the preliminary examinations and surveys which the Secretary of War has heretofore been authorized and directed to make of waterways with a view to the control of their floods, the Secretary of Agriculture be, and he is hereby, authorized and directed to cause preliminary examinations and surveys to be made for run-off and waterflow retardation and soil-erosion prevention on the watersheds of said waterways, the costs thereof to be paid from appropriations heretofore or hereafter made for such purposes." (Act of Aug. 28, 1937 (sec. 3) 50 Stat. 877, 33 U. S. C. 701b Note.)</p> <p>"The Secretary of Agriculture is authorized and directed to examine, locate, and recommend for purchase such forested, cut-over, or denuded lands within the watersheds of navigable streams as in his judgment may be necessary to the regulation of the flow of navigable streams or for the production of timber and to report to the National Forest Reservation Commission the results of such examination; but before any lands are purchased by the Commission, said lands shall be examined by the Secretary of Agriculture in cooperation with the Director of the Geological Survey and a report made by them to the Commission showing that the control of such lands by the Federal Government will promote or protect the navigation of streams or by the Secretary of Agriculture showing that such control will promote the production of timber thereon." (Act of Mar. 1, 1911 (sec. 6) 36 Stat. 962; 16 U. S. C. 515 as amended by act of June 7, 1924 (sec. 6) 43 Stat. 654; 16 U. S. C. 515.)</p> <p>"The Secretary (of Agriculture) is authorized to conduct surveys, investigations, and research relating to the conditions and factors affecting, and methods of accomplishing most effectively, the policy and purposes of section 7 of this Act (which include "the protection of rivers and harbors against the results of soil erosion in aid of maintaining the navigability of waters and water courses and in aid of flood control"). (Act of Feb. 29, 1936 (parts of secs. 7 and 9) 49 Stat. 1145; 16 U. S. C. 500l.)</p> <p>"In connection with any new project, new division of a project, or supplemental works on a project there may be allocated to flood control or navigation the part of said total estimated cost which the Secretary (of the Interior) may find to be proper In connection with the making of such an allocation, the Secretary (of the Interior) shall consult with the Chief of Engineers and the Secretary of War, and may perform any of the necessary investigations or studies under a cooperative agreement with the Secretary of War." (Act of Aug. 4, 1939 (part of sec. 9) 53 Stat. 1194, 43 U. S. C. 485H (h)).</p>	<p>"In the consideration of all works and projects relating to flood control which may be submitted to the Board of Engineers for Rivers and Harbors for consideration and recommendation, said board shall, in addition to any other matters upon which it may be required to report, state its opinion as to (a) what Federal interest, if any, is involved in the proposed improvement; (b) what share of the expense, if any, should be borne by the United States; and (c) the advisability of adopting the project." (Act of Mar. 1, 1917 (part of sec. 3) 39 Stat. 950; 33 U. S. C. 701.)</p> <p>"It is hereby recognized that destructive floods upon the rivers of the United States, upsetting orderly processes, and causing loss of life and property, including the erosion of lands, and impairing and obstructing navigation, highways, railroads, and other channels of commerce between the States, constitute a menace to national welfare; that it is the sense of Congress that flood control on navigable waters or their tributaries is a proper activity of the Federal Government in cooperation with States, their political subdivisions, and localities thereof; that investigations and improvements of rivers and other waterways, including watersheds thereof, for flood-control purposes are in the interest of the general welfare; that the Federal Government should improve or participate in the improvement of navigable waters of their tributaries, including watersheds thereof, for flood-control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected." (Act of June 22, 1936 (sec. 1) 49 Stat. 1570; 33 U. S. C. 701a.)</p> <p>"All examinations and surveys of projects relating to flood control shall include a comprehensive study of the watershed or watersheds, and the report thereon in addition to any other matter upon which a report is required shall give such data as it may be practicable to secure in regard to (a) the extent and character of the area to be affected by the proposed improvement; (b) the probable effect upon any navigable water or waterway; (c) the possible economical development and utilization of water power; and (d) such other uses as may be properly related to or coordinated with the project. And the heads of the several departments of the Government may, in their discretion, and shall upon the request of the Secretary of War, detail representatives from their respective departments to assist the Engineers of the Army in the study and examination of such watersheds, to the end that duplication of work may be avoided and the various services of the Government economically coordinated therein: <i>Provided</i>, That all reports on preliminary examinations hereafter authorized, together with the report of the Board of Engineers for Rivers and Harbors thereon and the separate report of the representative of any other department, shall be submitted to the Secretary of War by the Chief of Engineers, with his recommendations, and shall be transmitted by the Secretary of War to the House of Representatives, and are hereby ordered to be printed when so made." (Act of Mar. 1, 1917 (part of sec. 3) 39 Stat. 950; 33 U. S. C. 701.)</p>
Department of the Interior: Bureau of Reclamation.			

TABLE I.—Legislation Authorizing Surveys of Water Resources by Federal Agencies (See Note 1)—Continued

Agency	Function	General authorization for surveys	Specific directives for surveys
Department of Interior. Bureau of Reclamation.	Irrigation.	<p>"The Secretary of the Interior is authorized and directed to make examinations and surveys for, and to locate and construct, . . . irrigation works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project; also the cost of works in process of construction as well as of those which have been completed." (Act of June 17, 1902 (sec. 2) 32 Stat. 383; 43 U. S. C. 411.)</p>	<p>"No expenditures for the construction of any new project, new division of a project, or new supplemental works on a project shall be made, nor shall estimates be submitted therefor, by the Secretary (of the Interior) until after he has made an investigation thereof and has submitted to the President and to the Congress his report and findings on—</p> <ol style="list-style-type: none"> (1) the engineering feasibility of the proposed construction; (2) the estimated cost of the proposed construction; (3) the part of the estimated cost which can properly be allocated to irrigation and probably be repaid by the water users; (4) the part of the estimated cost which can properly be allocated to power and probably be returned to the United States in net power revenues; (5) the part of the estimated cost which can properly be allocated to municipal water supply or other miscellaneous purposes and probably be returned to the United States." (Act of Aug. 4, 1939 (part of sec. 9) 53 Stat. 1193, 43 U. S. C. 485h.)
Department of Interior. Bureau of Reclamation.	Water Conservation and Utilization.	<p>"for the purpose of stabilizing water supply and thereby rehabilitating farmers on the land and providing opportunities for permanent settlement of farm families, the Secretary of the Interior . . . is hereby authorized to investigate water conservation and utilization projects in the Great Plains and arid and semiarid areas of the United States . . ." (Act of Oct. 14, 1940 (part of sec. 1) Public No. 848, 76th Cong., 3d Sess.)</p> <p>"The Secretary (of the Interior), by cooperative agreements, may arrange with the Department of Agriculture or with such other Federal or State agencies, as the President may deem desirable, for cooperation in the investigations and surveys of projects proposed under the authority of this act . . ." (Act of Oct. 14, 1940 (part of sec. 6) Public No. 848, 76th Cong., 3d Sess.)</p> <p>"It is therefore . . . declared to be the policy of Congress to assist in providing facilities for water storage and utilization in the arid and semiarid areas of the United States . . ."</p> <p>In order to effectuate the policy set out (in the preceding paragraph) and promote proper land use in the said areas, the Secretary of Agriculture is hereby authorized from time to time:</p> <ol style="list-style-type: none"> 1. To formulate and keep current a program of projects for the construction and maintenance of the said arid areas of ponds, reservoirs, wells, check-dams, pumplog installations, and other facilities for water storage or utilization, together with appurtenances to such facilities." (Act of Aug. 28, 1937 (parts of secs. 1 and 2), 50 Stat. 869, 16 U. S. C. 590r and 590s.) 	<p>"No construction of a project may be undertaken pursuant to the authority of this Act (<i>see opposite paragraph of "authorization" column</i>) unless and until the Secretary (of the Interior) has made an investigation thereof and has submitted to the President his report and findings on—</p> <ol style="list-style-type: none"> (1) the engineering feasibility of the proposed construction; (2) the estimated cost of the proposed construction; (3) the part of the estimated cost which properly can be allocated to irrigation; (4) the part of the estimated cost which probably can be repaid by the water users in accordance with the requirements of Section 4; (5) the part of the estimated cost which can properly be allocated to municipal or miscellaneous water supplies or power and probably returned to the United States in revenues therefrom; (6) the part of the estimated cost which can properly be allocated to the irrigation of Indian trust and tribal lands, and be repayable in accordance with existing law relating to Indian lands; (7) the part of the estimated cost which can properly be allocated to flood control as recommended by the Chief of Engineers, War Department. <p>In connection with each such investigation, report, and finding, the Secretary shall consult with the Secretary of Agriculture regarding participation in the proposed project by the Department of Agriculture under the authority of Sections 5 and 6; and the Secretary (of the Interior) shall also transmit to the President a report by the Secretary of Agriculture to the President on the participation, if any, proposed by the Department of Agriculture." (Act of Oct. 14, 1940 (part of sec. 3) Public No. 848, 76th Cong., 3d Sess.)</p> <p>"The facilities to be included within such program (<i>see opposite paragraph in "authorization" column</i>) shall be located where they will promote the proper utilization of lands and no such facilities shall be located where they will encourage the cultivation of lands which are submarginal and which should be devoted to other uses in the public interest." (Act of Aug. 28, 1937 (part of sec. 2), 50 Stat. 869; 16 U. S. C. 590s.)</p> <p>"On any one project undertaken pursuant to the Act of August 28, 1937 . . . as amended and supplemented, expenditures for the construction, maintenance, operation, rehabilitation or financial assistance of any one project shall not exceed \$50,000 of Federal funds, whether appropriated or allocated or both." (Act of Oct. 14, 1940 (part of sec. 7) Public No. 848, 76th Cong., 3d Sess.)</p>
Department of Agriculture, Office of Land Use Coordination. Bureau of Agricultural Economics. Soil Conservation Service. Farm Security Administration.			

TABLE I.—*Legislation Authorizing Surveys of Water Resources by Federal Agencies (See Note 1)—Continued*

Agency	Function	General authorization for surveys	Specific directives for surveys
Federal Power Commission.	Water Power.	<p>"The (Federal Power) Commission is hereby authorized and empowered—(a) to make investigations and to collect and record data concerning the utilization of the water resources of any region to be developed, the water-power industry and its relation to other industries and to interstate commerce, and concerning the location, capacity, development costs, and relation to markets of power sites, and whether the power from Government dams can be advantageously used by the United States for its public purposes, and what is a fair value of such power, to the extent the Commission may deem necessary or useful for the purposes of this Act." (Act of June 10, 1920 (part of sec. 4) 41 Stat. 1065; 16 U. S. C. 797.)</p> <p>"Upon its own motion to order an investigation of any occupancy of, or evidenced intention to occupy, for the purpose of developing electric power, public lands, reservations, or streams, or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations, and among the several states, by any person, corporation, state, or municipality, and to issue such order as it may find appropriate, expedient, and in the public interest to conserve and utilize the navigation and water power resources of the region." (Federal Power Act, section 4 (g), as amended by act of Aug. 26, 1935; 49 Stat. 839; 16 U. S. C. 797.)</p> <p>"Whenever, in the judgment of the (Federal Power) Commission, the development of any water resources for public purposes should be undertaken by the United States itself, the Commission shall not approve any application for any project affecting such development, but shall cause to be made such examinations, surveys, reports, plans, and estimates of the cost of the proposed development as it may find necessary, and shall submit its findings to Congress with such recommendations as it may find appropriate concerning such development". (Part of sec. 7 (b), Federal Power Act, as amended by the Act of Aug. 26, 1935; 49 Stat. 842; 16 U. S. C. 800.)</p> <p>"In order to secure information necessary or appropriate as a basis for recommending legislation, the Commission is authorized and directed to conduct investigations regarding the generation, transmission, distribution, and sale of electric energy, however produced, throughout the United States and its possessions, whether or not otherwise subject to the jurisdiction of the Commission, including the generation, transmission, distribution, and sale of electric energy by any agency, authority, or instrumentality of the United States, or of any State or municipality or other political subdivision of a State. It shall, so far as practicable, secure and keep current information regarding the ownership, operation, management, and control of all facilities for such generation, transmission, distribution, and sale; the capacity and output thereof and the relationship between the two; the cost of generation, transmission, and distribution; the rates, charges, and contracts in respect of the sale of electric energy and its service to residential, rural, commercial, and industrial consumers and other purchasers by private and public agencies; and the relation of any or all such facts to the development of navigation, industry, commerce, and the national defense. The Commission shall report to Congress the results of investigations made under authority of this section." (Sec. 311, Federal Power Act, as amended by the Act of Aug. 26, 1935; 49 Stat. 859; 16 U. S. C. 825J.)</p>	<p>"Penstocks or other similar facilities adapted to possible future use in the development of hydro-electric power shall be installed in any dam herein authorized when approved by the Secretary of War upon the recommendation of the Chief of Engineers and of the Federal Power Commission." (Act of June 28, 1938 (part of sec. 4) 52 Stat. 1216; 33 U. S. C. 701.)</p> <p>"All licenses issued by the Federal Power Commission shall be on the following condition (among others) "That the project adopted, including the maps, plans, and specifications shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development and for other beneficial public uses, including recreational purposes." (Part of sec. 10, Federal Power Act, as amended by the Act of Aug. 26, 1935; 49 Stat. 842; 16 U. S. C. 803.)</p>
Federal Works Agency: Public Health Service. Department of the Interior: Fish and Wildlife Service.	Pollution.	<p>• • • "the Public Health Service may study and investigate the diseases of man and conditions influencing the propagation and spread thereof, including sanitation and sewage and the pollution either directly or indirectly of the navigable streams and lakes of the United States, and it may from time to time issue information in the form of publications for the use of the public." (Act of Aug. 14, 1912 (part of sec. 1) 37 Stat. 309; 42 U. S. C. 7.)</p> <p>"The Secretary of Agriculture and the Secretary of Commerce (see Note 2) are authorized to make such investigations as they may deem necessary to determine the effects of domestic sewage, trade wastes, and other polluting substances on wildlife, with special reference to birds, mammals, fish, and shell fish, and to make reports to the Congress of their investigations with recommendations for remedial measures. Such investigations shall include studies of methods for the recovery of wastes and the collection of data on the progress being made in these fields for the use of Federal, State, municipal, and private agencies." (Act of Mar. 10, 1934 (sec. 2) 48 Stat. 401, 16 U. S. C. 662.)</p>	

TABLE I.—Legislation Authorizing Surveys of Water Resources by Federal Agencies (See Note 1)—Continued

Agency	Function	General authorization for surveys	Specific directives for surveys
Department of the Interior: National Park Service.	Recreation.	"The Secretary of the Interior * * * is authorized and directed to cause the National Park Service to make a comprehensive study, other than on lands under the jurisdiction of the Department of Agriculture, of the public park, parkway, and recreational-area programs of the United States, and of the several States and political subdivisions thereof, and of the lands throughout the United States which are or may be chiefly valuable as such areas, but no such study shall be made in any State without the consent and approval of the State officials, boards, or departments having jurisdiction over such lands and park areas." (Act of June 23, 1936 (part of sec. 1) 49 Stat. 1894; 16 U. S. C. 17k.)	"The said study (see first paragraph in Recreation "authorization" column) shall be such as, in the judgment of the Secretary (of the Interior), will provide data helpful in developing a plan for coordinated and adequate public park, parkway, and recreational-area facilities for the people of the United States." (Act of June 23, 1936 (part of sec. 1) 49 Stat. 1894; 16 U. S. C. 17k.)

NOTE 1.—The foregoing table is selective rather than inclusive. It covers only continuing authority for investigations and omits authorizations often included in authorization and appropriation acts for Rivers and Harbors, Flood Control, and Reclamation such as, for example, the joint survey by the Corps of Engineers and the Public Health Service of pollution in the Ohio River and its tributaries (Rivers and Harbors Act of Aug. 26, 1937) and Federal Agency appropriation acts. The following are also not included:

1. General survey authority of the Geological Survey to gage the streams and determine the water supply of the United States, to investigate underground currents and artesian wells, and to prepare reports upon the best methods of utilizing water resources. This work is carried on under authority of annual appropriation acts and under authority of the Act of Mar. 3, 1879 (20 Stat. 394; 40 U. S. C. 31) to classify the public lands and examine the geologic structure, mineral resources, and products of the national domain.

2. General survey authority of the Office of Indian Affairs, the Tennessee Valley Authority, the Mississippi River Commission, the California Debris Commission, and the National Capitol Park and Planning Commission.

3. The duties of the Secretary of War, through the Beach Erosion Board, to make investigations for beach protection and restoration.

4. Investigations by the Secretary of War authorized by the Transportation Act of 1920 and the Maritime Act of 1920 (inland navigation facilities); duties of the Board of Investigation and Research established by the Transportation Act of 1940; investigating powers of the Inland Waterways Commission and the United States Maritime Board.

5. Research and information services of the Weather Bureau (precipitation data and flood forecasting) United States Coast and Geodetic Survey (charting tide and current data), and the Civil Aeronautics Authority (seaplane bases and anchorage areas).

NOTE 2.—Reorganization Plan No. II (H. Doc. 288, 76th Cong.) transferred these functions to the Secretary of the Interior.

TABLE II.—Outline of Major Federal, State, and Local Regulations Affecting the Use and Control of Water Resources

Practices	Major regulations		
	Federal	State	Local
Water transportation.....	Regulations of use, administration, and navigation of all navigable waters subject to Federal jurisdiction are in effect.	Some regulation of use, administration and navigation of waters exists in States in which there are navigable waters not subject to Federal regulation. Some State regulation exists also on many waterways subject to public control, covering phases of water transportation not at present controlled by Federal regulation.	Local regulation of harbor facilities is in effect in many harbors as an aid to Federal regulation.
Design of dams and other water-control works in streams and lakes.	No structure may be constructed in navigable waters without the approval of the War Department, which determines whether or not navigability would be unreasonably impaired. No dam or other structure for the production of hydroelectric power may be constructed in waters subject to Federal jurisdiction without a license from the Federal Power Commission.	All States exercise some form of regulation over dam construction. In 29 States there are active agencies which issue permits for new structures after examining the proposed designs. In the remainder no State administrative agency enforces such laws. In 7 States the State public health agency is responsible for the review of plans for proposed water improvements from the standpoint of malaria control. In 19 States the State engineer, State construction commission, or some other agency, is responsible for review of proposed or existing obstructions in water courses from the standpoint of fish conservation.	In a few States the county or township governments are responsible for supervision of dam design and operation.
Encroachment upon flood plains.	None.....	Three States have agencies which issue permits for the construction or alteration of structures in flood plains.	A few cities and counties control encroachment by using zoning ordinances, or by establishing encroachment lines.
Disposal of domestic and industrial wastes in streams to the detriment of other uses of water or land.	Deposition of waste other than sewage, which impedes navigation is prohibited. Discharge of oil from ships into tidal navigable waters is prohibited. Debris from hydraulic mining operations in California which would be carried into navigable waters or would otherwise cause damage may be deposited only under conditions set by the California Debris Commission	All States have State officers charged with promoting public health and wildlife conservation by pollution abatement. In 15 States they have authority to exercise a maximum or optimum degree of control in establishing limits of pollution, forcing remedial measures by polluters, in altering limitations on bonding power, and in organizing special districts. In 26 States there is only partial or ineffective control. Seven States have agencies which act in an advisory capacity but exercise no control.	Municipalities may determine the quality of wastes to be discharged from municipal sewer systems and may refuse to accept industrial waste of exceptionally deleterious character. As a practical matter it is difficult for municipalities by court action to force polluters to treat waste, nor is there any general regulation by local agencies.
Provision of public water supplies.	The quality of supplies used for interstate public carriers are subject to Federal inspection and approval.	Designs for new water supply systems and the operation of such systems are subject to inspection by State agencies in all States. In at least 2 States there must be approval of plans by other agencies to divert either surface or ground water for public supply, after determination of whether the plans are justified by public necessity, whether they will insure an adequate and safe supply of water, and whether they will affect either existing or future supplies of other municipalities or civil divisions.	Some large cities or metropolitan districts sell water to smaller communities with restrictions imposed by them. Some cities exclude small public or quasi-public water systems in suburban subdivisions or "additions," except the recognized system. Many cities have rigid regulations preventing or restricting the use of cross connections between public and private water-supply systems.
Excessive or wasteful use of underground waters.	Use of underground water on Federal lands and reserves is subject to regulation by the administering agency by withdrawals of land, inspection of oil wells, and similar measures.	Fourteen of the Western States have statutes imposing restrictions upon the installation and operation of artesian wells, or declaring waste therefrom to be a misdemeanor; but in only 7 States is there an administrative agency responsible for enforcement. In New Jersey and New York, State agencies review plans for new or additional developments of underground waters for public supply. Two central States prescribe regulations for construction of wells, public or private to insure healthful supplies. In New York an administrative agency, under legislative authority, requires the return to the ground of practically all water used in one critical area for air conditioning.	In some cities an attempt has been made to reduce excessive use of ground water for air conditioning, either by requiring permits at a high cost, or by imposing a high rental for sewers for disposal of the used water. Some cities require permits for drilling of any wells.
Construction of drainage works to increase agricultural production, or to reduce pest and malaria-bearing mosquitos.	None.....	Five States require that all new drainage enterprises be reviewed by a designated State official. In only 1 of these does the State exercise active administrative control.	Each organized drainage district—acting under the administrative and judicial review specified by State law—may determine lands to be drained and method of drainage within that district.
Maintenance of drainage works.	None.....	None.....	Each organized drainage district has individual responsibility for maintenance and operation of drains, pumps, and other drainage works.

ENERGY DEVELOPMENT POLICIES

INTRODUCTION

Definite steps toward better use of coal, oil, natural gas, and water power for emergency and for long-range purposes in the public interest are recommended in the following outline of a program for national energy resources. This program was developed by the Energy Resources Committee as a representative group including members from the chief Federal agencies concerned with action in these fields. Members of the staff who participated in the preparation of the report are: Wilbert G. Fritz, Lincoln Gordon, Glenn E. McLaughlin, and Samuel H. Thompson. It is presented in the hope that it may be useful in the determination of public policy. Specific projects for public works may well be subjected to the test of these recommendations, among other criteria.

It will be understood that not all of the detailed proposals for action contained in the report could be considered and approved by each of the members of this Committee, preoccupied as many of them are with matters of hourly urgency; and that the views expressed should not be construed as official commitments by the agencies with which they are connected. The recommendations, nevertheless, represent the consensus of judgment of the Committee as to major objectives.

The Energy Resources Committee, all of whom joined in transmitting the report to the Board, is composed of:

Ralph J. Watkins, Assistant Director, National Resources Planning Board, *Chairman*.

Capt. A. B. Anderson, United States Navy.

Arno C. Fieldner, Chief, Technologic Branch, Bureau of Mines, Department of the Interior.

Jerome N. Frank, Chairman, Securities and Exchange Commission.

John W. Frey, Associate Director, Petroleum Conservation, Oil Administration, Department of the Interior.

Leland Olds, Chairman, Federal Power Commission.

Stephen Raushenbush, Chief Special Agent, Bituminous Coal Division, Department of the Interior.

Brig. Gen. H. K. Rutherford, United States Army, War Department.

Joel D. Wolfsohn, Executive Secretary, National Power Policy Committee.

Samuel H. Thompson, *Secretary*

NATIONAL RESOURCES PLANNING BOARD

ENERGY DEVELOPMENT POLICIES

Introductory: The Problem

The Social Objective

The objective of social policy toward the energy resources of coal, petroleum, natural gas, and water power is "conservation and wise use"—the principle established by Theodore Roosevelt more than 30 years ago. Conservation does not mean abstinence or hoarding. It was defined by the Energy Resources Committee in 1939 as the *avoidance of unnecessary waste* in the production and utilization of energy resources and the *safeguarding in economic health* of the industries and the people necessary to develop these resources.¹

There is agreement on the general objective of conservation or wise use of energy resources because it coincides with the ultimate interests of all groups concerned—labor and capital, producer and consumer, State governments and the Federal Government. There is divergence of opinion only with respect to ways and means of attaining this objective. The three main fields of action described in the Committee's report of findings in 1939 were (1) promotion of greater efficiency in the production of energy resources from the standpoint of recovery, (2) promotion of greater economy in the use of fuels, and (3) placing a larger share of the energy burden on lower-grade fuels and water power.

Salient Facts of Energy Resource Availability

Fortunately for the standard of living in the United States, nature has been bountiful in her endowment of energy resources in our domain. We must not forget, however, that for the most part those resources are exhaustible and highly variable in availability. Coal, petroleum, and natural gas were millions of years in the making, and every unit used or wasted is so much wealth drawn from nature's storehouse. Water power is the one exception among the major energy resources, but water power is distinctly limited in quantity and in adaptability for use.

The magnitude of reserves may be indicated briefly as follows:

1. Coal of all ranks, from anthracite to lignite, 3,000 billion tons or the equivalent of 2,500 billion tons of bituminous coal, in comparison with 1939 production of somewhat less than one-half billion tons and accumulated production of about 24 billion tons.

2. Petroleum in proven natural reservoirs, 18½ billion barrels, in comparison with 1939 production of

1¼ billion barrels and accumulated production of 22¼ billion barrels. (But note that one-half of this accumulated production has taken place since the beginning of 1929.) The proven reserves are equal to 4–5 billion tons of bituminous coal.

3. Proven natural-gas reserves, from 60 to 100 trillion cubic feet, in comparison with 1939 consumption of nearly 2½ trillion cubic feet. This reserve is equivalent to 3–5 billion tons of bituminous coal.

4. Recoverable oil from shale has been estimated at 92 billion barrels, or the equivalent of 21 billion net tons of bituminous coal. Motor fuel would be recoverable from this source at a cost probably four times the present cost of making gasoline from natural reservoir oil.

5. Feasible undeveloped water power sites of the United States, when a market for their output exists, are estimated to be capable of producing six times as much energy as those now developed, but only a little more than twice the electric energy produced in 1937 for public use by fuel and water power plants combined (64 percent by fuel plants and 36 percent by hydro plants). All our water power, including both that already developed and that feasible of development, could produce energy annually equivalent to only about one-fourth of the energy contained in all mineral fuels consumed for all purposes in the country in 1937. Thus, it can be seen that water power can supply only a fraction of our energy requirements. The mineral fuels must bear the main burden.

It must be remembered that about half our coal reserves consist of low-rank coal and lignite; that 70 percent of the total lies in the semiarid plains and in the Rocky Mountain region, far from centers of population; and that 85 percent of our present production is from the 30 percent of the reserves east of the Mississippi River. Moreover, it must be noted that the United States Coal Commission found in 1923 a wastage of 1 ton of bituminous coal for every 2 tons mined; avoidable waste was estimated at 20 percent of the beds. Because of the depressed condition of the industry and because of increased mechanization, it is unlikely that we have made progress subsequently in reducing waste.

The ratio of proven reserves to current annual production is vastly greater for coal than for oil, about 5,000 to 1 against about 15 to 1. A comparison of these ratios indicates why there is generally more public concern over conservation of oil than over conservation of coal. Nevertheless, a rational policy must comprehend both resources. The margin for high-rank coal is not nearly so comfortable as the over-all figures might suggest. Pennsylvania anthracite has been

¹ *Energy Resources and National Policy*. National Resources Committee, January 1939, H. Doc. 160, 76th Cong., 2d sess.

estimated to be one-fourth exhausted, and many of the high-quality bituminous beds would face exhaustion in from one to three generations at the 1929 rate of depletion.

Although discovery of petroleum has recently more than kept pace with consumption, present knowledge suggests that the resource is distinctly limited. Fifteen years or two, three, four, or five times that number of years is a short period in the life of nations. To maintain our present relatively narrow margin of 15 years' supply of proven reserves, we shall have to discover more than $1\frac{1}{4}$ billion barrels of oil a year. Since consumption is rapidly growing, it may well be that we shall have to discover upwards of 20 billion barrels of petroleum over the next decade if we are to maintain our present reserve margin. That will be no easy task.

After our natural reservoir oil is exhausted or after the shortage becomes serious, we may be able to obtain oil from foreign sources or we can turn to oil obtained from coal, or oil shale, or—to a limited extent—to alcohol from vegetable matter, but at much higher costs. Consequently, no alarm need be felt over the possible break-down of our motorized civilization, but we may well be concerned over the higher costs and the prospect of handicaps in international competition. Thus, too rapid depletion of petroleum will force us to depend either on foreign sources or on more costly oil produced from coal, shale, or vegetable matter. A conservation program should seek to postpone that day as long as possible.

The Need for Federal Action

The need for conservation places a special obligation on the Federal Government. It is clear (1) that parts of the task can be accomplished only by the Federal Government, which has ultimate jurisdiction over the entire economy, and (2) that the Federal Government—as the only agency representing the entire national interest—should insure that the public interest is focussed on the objective of conservation. Industries and producing States in the field of energy resources have vital roles to play. For the most part, Federal action at the present time is directed toward reinforcing their efforts. There are, however, interstate and inter-enterprise aspects of the problem with which only the Federal Government can cope.

Prevention of waste in the energy-resource industries is primarily an economic problem of competitive industry. Wastes inhere in the economic organization of those industries, especially with reference to the multiplicity of ownership and operating units and the legal framework within which they must operate. The profit motive has led to increased efficiency in the utilization of energy resources. Consumers of fuels find it to their interest to make their purchases go

farther. Private gain, however, is not an adequate stimulus for all of the needs of conservation, and in fact may be the chief cause of wasteful exploitation. In the petroleum industry, for example, investment capital, reservoir energy, and petroleum reserves have been wasted as a result of efforts to obtain quick profits. The basis for public action then rests on the inherent limitations of enterprise in dealing with the problem of waste, and much of the responsibility devolves upon the Federal Government.

In most great river basins an integrated control of storage and release of water is beyond the scope of private enterprise, local governments, or States. The amount of available water power is very much dependent on the extent of Federal participation. Likewise, basic research in energy resources may be amply justified for the national interest, though not for private or local interests. Responsibility for the determination of general policy toward energy resources rests with the Federal Government, inasmuch as it may be expected to function more broadly than industry or than the governments of political subdivisions. The problem is not only to decide what the Federal Government should do, but also to determine what share of the total responsibility should be held by the industries and by the State governments.

Earlier Recommendations of the Energy Resources Committee

Recommendations of the Energy Resources Committee transmitted to the President in January 1939, may be summarized briefly as follows:²

1. The ills of the bituminous coal industry are a matter of national concern and Federal responsibility. Some form of Federal regulation of the industry is clearly necessary. Every opportunity should be provided for conclusive experiment with the controls provided in the Bituminous Coal Act of 1937.

2. A Federal oil conservation board or commission should be created within the appropriate Government department to administer the Federal interest in the oil and gas industry and to make necessary rules and regulations concerning the production of and commerce in oil and gas.

3. An active public policy of multiple-purpose development of water resources is desirable, particularly in view of the pressing character of problems related to flood control, public water supply, stream pollution, irrigation, and navigation. An active policy of public development of water power is likewise desirable under certain appropriate conditions. Both the development directly for power purposes, where there is no conflict with more urgent water control, and the best feasible use of the head made available by water

² *Ibid.*

storage for other purposes would contribute toward the attainment of three major national objectives, namely:

- (a) conservation of scarce fuel materials;
- (b) making cheaper electric energy more widely available;
- (c) assuring an ample supply of electric energy in time of war.

4. Both fundamental and applied research should be stimulated and supported by the Federal Government in the agencies concerned with the energy resources, and this research should be vigorously pointed in the direction of conservation in production and use of these resources. Special consideration should be given to conservation of high-rank fuels.

5. There must be continuous adequate planning and provision for studies which will reflect the best technical experience available as well as full consideration for both regional and group interests. Organization of an advisory planning group was recommended, the group to include representatives from the Federal and State agencies concerned, from the industries, and outside experts.

Development of a Program for Specific Action

The States and the Federal Government have introduced, without much attention to coordination, various measures aimed to facilitate wise use of energy resources. In the main, each of the efforts has been directed toward the problems of a single category, such as the correction of demoralizing and wasteful practices and conditions in the petroleum and natural-gas industries, the relief of economic distress and the promotion of safety in coal mining, or the protection of the public interest in water power. The problem of the relationship of these energy resources to each other calls increasingly for consideration.

It is time to take a broader view. It is time to recognize more fully the interlocking relationship among the diverse problems affecting energy resources, to weight conflicting interests and points of view, and to strive to resolve these conflicts in the interest of the continuing needs of an economy based on large-scale use of low-cost energy.

At the present time it is particularly desirable to outline plans for energy resources in more detail than has been possible heretofore. The conclusions and recommendations of the Energy Resources Committee have raised many practical problems with respect to future planning for these resources. A major problem is that of preparing a program in terms of projects, research needs, and coordinated policies against which any proposal or project advanced for the energy resources can be judged.

There are no less than 20 separate Federal agencies concerned with problems of energy resources. In addition, there are many interested State agencies some of whose powers overlap or duplicate those of the Federal agencies. From this divided responsibility and authority must emerge an integrated national policy for energy resources, for it is difficult to envisage a national coal policy, a national petroleum policy, or a national water-power policy, without also a national policy directed toward all energy resources.

With this objective in mind, the following statement of "Major Elements in a Long-Range Program for Conservation and Wise Use of the Energy Resources" has been prepared by the Energy Resources Committee. The outline is broadly stated but pointed to specific aims in order to suggest how work on special phases of energy resources may be molded to serve the public interest. Major focus is placed on the long-run objective of stability and balanced national development, and emergency measures are considered against that background. The work completed or now being done on coal, petroleum, natural gas, and water power is the foundation on which an integrated policy toward energy resources can be built.

Major Elements in a Long-Range Program

A. Broad Objectives

1. *Develop the Nation's energy resources with a view to a strengthened national economy.*—a. Safeguard the Nation's patrimony in energy resources by (1) promoting greater efficiency in the production of mineral fuels from the standpoint of recovery, (2) promoting greater economy in the use of fuels, (3) placing a larger share of the energy burden on lower-rank fuels and on water power, and (4) giving primary claim on each resource to those uses for which it is peculiarly suited.

b. Expand the standard of living through making available an increasing per capita supply of energy.

c. Advance long-run consumer interests through efficient production, distribution, and utilization; through determination of standards of quality and of prices in the public interest; and through the use of the several fuels and of water power for the purposes to which each is especially adapted.

d. Secure protection and advancement of labor standards and stabilize employment in the energy-resource industries.

e. Coordinate construction in the field of energy resources with public works policy.

2. *Provide effective measures for coping with national emergencies.*—a. Assure an ample and readily available supply of the energy materials necessary for national defense.

b. Eliminate bottlenecks in the flow of energy-resource materials.

c. Provide such controls with regard to the energy resources as may be required to minimize both emergency and post-emergency disturbances to the American economy.

3. *Promote a better understanding of the problems of conservation.*—a. Center attention on the benefits of conservation and wise use to producers, consumers, employees, and the public.

b. Evaluate more fully the benefits and costs of conservation measures, investigate means of meeting those costs, and disseminate information pertaining thereto.

4. *Provide for continued planning and investigation.*—

a. Promote further planning and research in order to guide public and private agencies toward the fullest realization of the above-stated objectives.

b. Reappraise existing regulatory mechanisms for the energy-resource industries.

c. Investigate the repercussions of prospective technological advances in energy supply with a view to mitigating their effects upon groups dependent on the existing industries.

d. Promote feasible development of new energy sources, including atomic energy, vegetable fuels, shale, solar radiation, and tidal energy.

B. Coal

1. *Promote a better understanding of the coal-conservation problem and of coal's significance in living standards.*—a. Shift emphasis from the rate of utilization of total tonnage of coal in the ground to the more realistic problem of increasing costs attending exhaustion of the better portions of the reserve supply.

b. Promote methods for more complete extraction of coal.

c. Develop a better perspective on the gradations of coal from low rank to high rank and on the need for reserving exhaustible supplies of particular ranks for particular uses, such as coal suitable for coke production.

d. Study the quality and location of coal reserves and the freight-rate structure with respect to trends in economic development, including the location of industry.

e. Make coal conservation and utilization part of a unified program for maximizing benefits from land in the public domain.

f. Provide for continued planning for better conservation and utilization of coal and for prompt revision of plans to meet new conditions.

2. *Consider methods of reducing instabilities and alleviating their effects.*—a. Adopt measures to reduce short-term fluctuations (seasonal, cyclical, or irregular) in production and to provide subsidiary employment for slack periods.

b. Provide for progressive adaptation to long-run trends in the industry: (1) Improve the means for rehabilitation of displaced miners; (2) prevent regional displacement not related to long-term factors such as exhaustion or shifts in population and industry.

3. *Improve the standards of operation and management.*—a. Reexamine existing mining practices to determine the extent to which they may be obsolete and consequently inimical to conservation and consider new mining methods with respect to their conservation possibilities.

b. Develop a better understanding of the relation between fixed and variable costs in determining how thoroughly reserves should be worked.

c. Foster the further development of low mining machines capable of removing coal with high extractive efficiency, and encourage their use where hand methods are unprofitable or wasteful.

d. Discourage the mining of coal from beneath overlying beds unless such beds are not economically valuable or their recovery will not be impaired by the removal of the deeper beds.

e. Require better mapping and planning of operations to facilitate more thorough mining, to provide adequate records of abandoned workings in order to facilitate full and safe access to remaining reserves when operations are resumed, and to prevent opening an excessive number of mines.

f. Enforce higher safety standards, not only to reduce injury and loss of life but also to prevent haphazard and wasteful exploitation of reserves.

g. Study the effects of the short workweek in relation to the following factors: (1) Safety of operation, (2) productivity, (3) employment, (4) costs of production, (5) mechanization, (6) orderly development of mining, (7) losses in mining, (8) use of the multiple shift, particularly from standpoint of thorough and intensive utilization of reserves, and (9) seasonal and cyclical irregularities in work.

h. Promote improvement in standards of education, living conditions, working conditions, and labor relations in the industry.

i. Consider the practical results of the leasing system on the public domain and its applicability to the coal industry in general.

4. *Study the relation of transportation problems to the coal industry.*—a. Consider the adequacy of transportation facilities to meet possible emergency demands for coal.

b. Since freight constitutes approximately half of the average delivered price of coal, develop a major plan for transportation in which movements by rail, water, and road are properly coordinated.

c. Determine inefficiencies in the current transportation of coal and other commodities, resulting from

(1) roundabout haulage, (2) cross hauling, (3) failure to use back hauls to balance traffic, and (4) inequities in the freight rate structure.

5. *Promote improved utilization.*—a. Improve equipment for burning coal to provide efficient smokeless combustion and automatic stoking as an aid to conserving fuels with a higher form value. Consideration should be given to the extension of credit for the purchase of such equipment.

b. Improve methods of preparation, including cleaning and sizing.

c. Find an effective solution of the smoke problem. Smoke signifies wasteful utilization as well as unwholesome environment and heavy social costs.

d. Improve methods for deriving better fuels—coke, semicoke, powdered coal, liquid fuel, and gaseous fuel—from coal, and for utilizing such fuels.

e. Improve methods of enhancing the utility of the abundant reserves of low-rank coal.

f. Consider the wider use of coal for generation of electrical energy to supplement hydroelectric power in periods of low stream flow.

g. Continue experimentation in the utilization of by-products, not only to improve the quality and variety of organic products but also to reduce the cost of producing a smokeless and otherwise superior fuel from coal.

6. *Assure proper consideration of the problem of minimizing long-run disturbances in emergencies.*—a. Introduce controls of prices and priority of use appropriate to prevent serious economic unbalance.

b. Prevent undue waste under the pressure of emergency requirements.

c. Promote an adjustment of capacity for mining, preparing, coking, transporting, and storing coal consistent with long-term growth, and facilitate temporary increases through more intensive use and reconditioning of existing facilities where expanded requirements relate only to emergency increases or dislocations in demand.

d. Consider the special problems of supply connected with the critical war needs for coal, the location of defense industries which consume large tonnages of coal, and the maintenance of a flow of coal to points served by coastwise routes.

e. Encourage such allocation of authority for emergency control as will achieve the objective of (1) effective administration for emergency requirements and (2) consideration for the continuing needs of conservation.

7. *Examine the Federal Government's experiments in regulation.*—a. Reappraise the Bituminous Coal Act of 1937 in the light of the major problem of the industry and the administrative experience to date.

b. Determine desirable changes, if any, in the basic

regulatory act with respect to the following points: (1) Extensions of authority, (2) limitations of authority, and (3) simplifications of procedure.

c. Evaluate the effectiveness of administration in view of (1) legal requirements, (2) discretionary functions, and (3) the broad objectives of Federal regulation.

8. *Develop a program for wider State-Federal cooperation.*—a. Assure balance between centralization and decentralization of control and coordination of research on mining and utilization problems.

b. Assure coordination between steps taken by Pennsylvania in the regulation of the anthracite industry and the broader Federal program for the entire coal industry.

C. Petroleum and Natural Gas

1. *Promote a better understanding of the urgent need for conservation of oil and gas.*—a. Emphasize the limited character of proved reserves both in terms of growing consumption and in terms of equivalent reserves of coal, making it clear that proved reserves include only the oil known to be recoverable from fields already discovered.

b. Stress the peculiar dependence of means of transportation on petroleum products and urge the efficient production and use of oil for these mobile uses.

c. Explore the causes of overproduction and waste of oil in relation to its distribution and to its consumption for less essential purposes.

2. *Promote maximum recovery of oil and gas.*—a. Encourage the adoption of plans for rational coordinated development of oil and gas structures to the end that the wastes of competitive off-set drilling will be avoided.

b. Provide direct and indirect means of stimulating the pooling of lease and royalty interests so that efficient unit operation of pools will be facilitated.

c. Encourage substitution of the principles of correlative rights and of ownership-in-place for the "rule of capture" by stimulating research in measurement of underground reserves.

d. Set up Federal minimum standards for field operation to be enforced by the denial of interstate commerce to oil produced by substandard methods, and assist the States in raising the standards of field operation.

e. Devise methods to promote stability of production.

f. Study the problem of regulating production in fields located far from adequate markets.

g. Encourage the maintenance of stripper wells in an operative status by the control of flush production to avoid market demoralization.

h. Encourage the development and adoption of operating procedures that will recover optimum amounts of oil by primary recovery and leave the formations in condition for later recovery by feasible secondary operations or by improved methods.

i. Furnish technical assistance to the industry to achieve these objectives.

3. *Stimulate economy in oil and gas use and protect the more efficient and indispensable uses.*—a. Encourage the development of more efficient motors and also of motors which use less volatile fractions of crude oil.

b. Promote more efficient methods of distributing petroleum products.

c. Protect those uses of petroleum, notably lubricants and gasoline, for which available substitutes are relatively the most costly.

d. Discourage the use of oil for purposes for which heat or power from other sources are suitable and economic, and in which the convenience factor is of minor significance.

e. Encourage conservation of petroleum by aiding railway transportation and rapid transit service wherever they are clearly the most economical means of movement.

4. *Provide for the integration of emergency needs for oil and gas within the framework of long-range conservation plans.*—a. Provide for current estimates of emergency requirements for oil and gas.

b. Insure a minimum of waste by arranging for an orderly expansion of production to meet emergency needs.

c. Minimize post-emergency disturbances by encouraging the maximum efficient use of existing production facilities in advance of the development of new fields.

d. Protect the national defense by (1) expanding the military reserves and protecting them from commercial exploitation, and (2) withdrawing from general use reserves of oil and natural gas of such types as are particularly suitable to yield products of special military significance.

e. Establish emergency powers adequate to control the allocation of production and refining among States and to control the prices of petroleum and its products and interfuel price relationships.

5. *Improve governmental supervision of the oil and gas industries.*—a. Reappraise the existing regulatory mechanisms, including those dealing with production, transportation, marketing, and the forms of business organization.

b. Create a Federal oil conservation body to administer the interest of the Federal Government in oil and gas, to cooperate with the States in protecting the Nation against waste, and otherwise to pursue the above stated objectives.

c. Discourage exports, and maintain a tariff policy favorable to imports, particularly of crudes not readily available in the domestic market.

d. Secure protection of the long-run interests of consumers.

D. Water Power and Electric Energy

1. *Promote a better understanding of the place of water power in conservation of the energy resources.*—a. Emphasize the peculiar characteristic of water power, that it is wasted through nonuse.

b. Stress the fact that in general hydroelectric power will ultimately supplement steam-electric power, not replace it; that power at storage reservoirs is best suited, in general, to carrying high peak loads of short duration which do not require much fuel but are expensive to carry with steam-electric equipment.

c. Point out the desirability of developing economically sound multiple-purpose water projects to play their proper part in meeting the expanding demand for electricity while conserving petroleum, natural gas, and high-rank coals and providing low-cost total energy supply.

2. *Insure the full development of water power as an ultimate part of a coordinated program of multiple-purpose drainage-basin control.*—a. Protect the ultimate development of full water power potentialities in the preliminary design of all water-control works. Sales of power will contribute to the economic feasibility of projects designed primarily for other purposes; and the design of projects to serve jointly a number of purposes will often make power development desirable where a project exclusively for power would not be warranted.

b. Construct fuel plants where needed in conjunction with public hydroelectric plants to provide the best balance of system capacity and to utilize each energy resource for its most efficient function in a coordinated program of low-cost power supply.

c. Include in Federal policy a degree of control over the operations of private water-power plants in the streams covered by any basin plan, sufficient to insure that they will harmonize with those of the general plan.

d. Operate power production and main-line transmission from multiple-purpose water-control projects under public auspices.

e. Explore methods of allocating joint costs and fixing rates in order to distribute costs fairly among the various products of the control projects and to avoid undue advantage for any one group of beneficiaries to the detriment of others.

f. In distribution of publicly produced power, follow the established policy of preference to States, their political subdivisions, and nonprofit cooperatives.

3. *Establish feasible interconnection among generating plants and load centers.*—a. Establish interconnections wherever economically justified to permit generation at lowest over-all cost, through concentration of base load on the most efficient steam electric stations, and on run-of-the-river hydroelectric stations, with peak demands cared for by storage hydro plants and by the less efficient fuel stations.

b. Promote through interconnection and coordination: (1) Improvement in system load factors by combining diversified demands, (2) the most fruitful utilization of falling water and hydroelectric equipment, (3) reduction in reserve requirements, and (4) increased reliability of service.

4. *Promote the widest extension of domestic and rural utilization of electricity.*—a. Foster the further adoption of promotional retail rate schedules and more progressive service, to take advantage of the demonstrated high elasticity of demand for electricity. In the future, as hitherto, public power developments may appropriately take the lead in this policy.

b. Continue to extend electric lines to rural areas as rapidly as possible, both through cooperative action with Rural Electrification Administration assistance and through private enterprise, in order to achieve the utmost feasible degree of rural electrification on a self-liquidating basis.

c. Encourage the development and wide distribution of low-cost, efficient electric appliances designed to fit the requirements of lower income groups.

d. Provide opportunity for financing the purchase of equipment at low interest rates over a reasonable term of years, through extension of credit facilities by manufacturers, the utilities, or public credit agencies.

5. *Explore the influence of low-cost electricity on industrial location and agricultural diversification.*—a. Encourage investigation and experimentation by the appropriate local, State, regional, and Federal agencies into the influence of power costs on the location and growth of various forms of economic activity.

b. Encourage the location of new electrochemical, electro metallurgical, and other large power-consuming industrial plants in regions where natural conditions permit the production of abundant low-cost power, from water or from fuel, in conjunction with the necessary raw materials and transportation.

c. Explore the potentialities of electricity in promoting industrial decentralization as a contribution to the relief of urban congestion.

d. Promote the development of light industries in rural areas as a means of reducing underemployment and raising living standards.

e. Initiate action by the appropriate agencies on the contribution of electricity to a healthy and diversified agriculture, through refrigeration, quick-freezing methods, mechanization of farm processes, water heating for sterilization, etc.

6. *Assure an ample supply of electric energy in time of war.*—a. Assure the maintenance of sufficient reserve generating capacity to care for wartime needs without curtailment of essential civilian demand and to avoid a power shortage like that faced by the United States

toward the end of the last war. When determining the additional generating capacity required, consideration should be given to the capacity now available, if industry operates on two or more shifts and the added load is distributed insofar as possible to avoid coincident peaks.

b. In pursuing a program of region-wide and interregional interconnection, give priority to war-material areas, where interconnection will make present capacity more widely available, and at the same time substantially increase the dependability of the supply.

7. *Develop a more comprehensive public power policy.*—a. Reappraise existing governmental activities in this field and promote the further development of positive and coordinated power policies on the part of Federal, State, and local governmental units.

b. Continue the integration of holding company systems under the Securities and Exchange Act in harmony with other elements of public power and financial policy.

E. Inter-resource Relationships

1. *Promote comprehensive analysis of the relations among the various energy resources materials.*—a. Study the location of reserves with respect to consuming areas, and analyze regional dependence on each energy form.

b. Analyze the cost of obtaining the energy materials, and of converting them into power, heat, and other use units.

c. Study the factors responsible for changes in the comparative delivered costs of competing fuels in major consuming markets.

d. Study long-time trends in the utilization of each energy source as they relate to location, suitability for use, cost of appropriation, and exhaustibility of supply.

2. *Encourage substitution of other energy resources for oil, gas, and high rank coal.*—a. Assist in the improvement of automatic, convenient coal burning furnaces.

b. Continue efforts to produce from coal (preferably low rank) a low cost motor fuel, either through pulverization or through conversion into liquid or gaseous forms.

c. Stimulate development of water power and production of low rank coal and other energy forms.

3. *Guide the process of inter-resource substitution.*—a. Avoid sudden increases in production which lead to ephemeral substitution of one energy form for another.

b. Control the rate of substitution of one energy source for another in order to avoid economic maladjustments.

c. Protect the various needs of energy consumers by providing leadership in the development of appropriate substitute energy forms.

