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**NATIONAL IRRIGATION POLICY
ITS DEVELOPMENT AND
SIGNIFICANCE**

NATIONAL IRRIGATION POLICY—ITS DEVELOPMENT AND SIGNIFICANCE

CORRESPONDENCE AND PAPERS

EXCHANGED BETWEEN

THE BUREAU OF RECLAMATION AND SENATOR CARL
HAYDEN, CONSISTING OF A TREATISE ON "WHAT
FEDERAL RECLAMATION MEANS TO THE UNITED
STATES," AND A DISCUSSION ON THE NATIONAL
IRRIGATION POLICY, ITS DEVELOPMENT
AND ITS SIGNIFICANCE



PRESENTED BY MR. HAYDEN

FEBRUARY 27, 1939.—Referred to the Committee on Printing

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SENATE RESOLUTION No. 90

[Reported by Mr. Hayden]

IN THE SENATE OF THE UNITED STATES,
February 28 (legislative day, February 27), 1939.

Resolved, That certain correspondence and papers exchanged between the Bureau of Reclamation and Senator Carl Hayden consisting of a treatise on "What Federal Reclamation Means to the United States and a Discussion on the National Irrigation Policy, Its Development and Its Significance" be printed as a Senate document, with illustrations.

Attest:

EDWIN A. HALSEY, *Secretary.*

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FOREWORD

UNITED STATES SENATE,
COMMITTEE ON APPROPRIATIONS,
February 2, 1939.

Mr. JOHN C. PAGE,
*Commissioner, Bureau of Reclamation,
Department of the Interior, Washington, D. C.*

MY DEAR SIR: I shall appreciate your having prepared as soon as practicable essential information bearing on Federal reclamation from a national standpoint. It seems to me the material might well review the history of irrigation conditions in the West that make necessary the development of reclamation as a national policy. What the program has achieved both nationally and regionally, what is contemplated for the future, and such other information which may be enlightening to Members of the Congress and the public should be included. Will you be kind enough to explain the relationship between the Indian irrigation program and the reclamation program of your Bureau? It may be well to include data with reference to the extent and operation of the former.

I trust that by this request I am not imposing too great a burden upon your facilities, and I hope that you can promptly furnish me with data covering the points I have raised, as well as any other pertinent facts which may occur to you.

Yours very sincerely,

CARL HAYDEN,
United States Senator.

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington, D. C., February 24, 1939.

HON. CARL HAYDEN,
United States Senate.

DEAR SENATOR HAYDEN: In response to your letter of February 2, requesting information bearing on Federal reclamation from a national standpoint, the enclosed material has been compiled carefully from authoritative sources available to the Bureau of Reclamation.

This material has been prepared, for easy use, in 13 chapters, supplemented by 9 appendixes. The synopsis, which precedes chapter I, reviews briefly the material which follows.

We have attempted in chapter I to explain, for the benefit of those who may not be entirely familiar with the West, the reasons why irrigation is essential to the development of the arid and semiarid section. The history of irrigation then is reviewed, and the Reclamation Act of June 17, 1902, is discussed to provide additional background.

From chapter VI to the end of chapter XIII specific topics of special interest are discussed. These include: Some National Benefits of Reclamation; Reclamation and the Western States; Achievements of Federal Reclamation; Results of the Construction Program; Reclamation Crop Production; Electric Power and Reclamation; Financial Aspects of Reclamation; Indian Irrigation Projects; Extent of Irrigation—Present and Future; and Federal Reclamation and Readjustments in land uses.

Statistical material, charts, and certain valuable reference material are included in the appendixes.

A sincere effort has been made to provide a brief discussion of the many phases of the national irrigation policy and the bearing of this national policy on the public welfare. Reference material has been cited in footnotes for the convenience of anyone who may wish to pursue particular subjects further.

This information might be assembled as a treatise on "What Federal Reclamation Means to the United States."

Very truly yours,

R. B. WILLIAMS,
Acting Commissioner.

SYNOPSIS

It is as right for the National Government to make the streams and rivers of the arid regions useful by engineering works for water storage as to make useful the rivers and harbors of the humid regions by engineering works of another kind.

* * * * *

Our people as a whole will profit, for successful homemaking is but another name for upbuilding of the Nation.—Excerpts from message of President Theodore Roosevelt to Congress in December 1901.

When Theodore Roosevelt became the President of the United States in 1901, the first major task to which he addressed himself was the establishment of a national program for the conservation of the land and water resources of the West. The fundamental principles he advanced in his message to the Congress formed the basis for the reclamation law which was subsequently enacted with his approval on June 17, 1902.

It was not wholly a new policy. One hundred years before, Thomas Jefferson, preaching conservation, had led the Nation in a program of internal improvements.

The Federal Government had sponsored, through the homestead and other laws, the settlement of the West. Little had been done, however, to aid the settler in combating natural handicaps or to provide him with reasonable security.

For many years preceding the enactment of the reclamation law, Federal sponsorship of irrigation had been urged. The Western States were young, sparsely populated, with severely limited taxable resources. Private initiative and cooperative effort had provided for the irrigation of 9,000,000 acres. The value and permanency of the contribution irrigation could make to western development had been demonstrated.

Further irrigation development, without participation by the Federal Government, seemed remote, because of increasingly difficult engineering and financial problems which were being encountered as the simple water diversions were exhausted. The problem of extension of irrigation began to attract national attention and interest. A terrible drought was visited upon the Great Plains in 1890, originating a migration farther westward from that area, similar to that now in progress as a result of the droughts of 1934 and 1936.

Business and industrial leaders, impressed by the market for manufactured goods afforded by the purchasing power of the more than 4,000,000 persons in the West by the later 90's, saw opportunities for further expansion of home markets. All three political parties endorsed in their 1900 national platforms the Federal sponsorship of irrigation in the West.

West of the one-hundredth meridian, there are more than 700,000 000 acres of arid and semiarid lands and mountainous wastes.

Except for comparatively small areas along the northern Pacific coast and in the high mountains, the annual rainfall averages from 3 to 20 inches.

Thirty-seven years ago, as now, the Federal Government owned more than 50 percent of the area. The arid and semiarid section includes all or the major part of the States of Washington, Oregon, California, Idaho, Utah, Nevada, Arizona, Montana, Wyoming, Colorado, and New Mexico and substantial parts of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.

In the reclamation law of 1902, the Congress definitely established the principle that development of the West is a national consideration. The conservation of the limited water resources of the arid west, to provide homemaking opportunities for large numbers of Americans, was made a national objective. The Federal Government, looking to constructive social and economic objectives, began to participate actively in the execution of soundly considered plans for reclamation.

In its financial aspects, the reclamation program differs from other programs for internal improvement under Federal auspices. In the original plan proceeds from the sale of public lands were to be invested in irrigation works in the Western States. These funds were not to be expended as gifts but were to be repaid by water users into the reclamation revolving fund, from which appropriation for additional construction could be made. The sources of revenues to this fund necessarily have been increased, but the repayment principle has remained unchanged.

In its operation, the Federal reclamation program since 1902 has embraced construction of projects for irrigation of desert lands, and construction of water-storage works for the provision of supplemental water supplies for irrigated areas, originally privately developed, but which were rendered insecure and unproductive by water shortages. Although new lands irrigated by Federal projects in 37 years represent less than 1 percent of the total cropped area of the United States, they contribute materially to the welfare of a large section of the population.

Since reclamation seeks, as a conservation activity, prudent economical utilization of the water resources of the West, the development of hydroelectric power in connection with and incidental to irrigation works has been recognized as a means of spreading more widely the benefits of this public program. The double use of water is a vital factor in attaining financial security for the Federal investment, since sale of the byproduct, power, provides a second and considerable source of revenue. In addition to irrigation and power, irrigation storage dams on larger streams have been constructed to serve concurrently other purposes such as flood control, improvement of navigation, provision of domestic water supplies for urban areas, provision of recreational opportunities, and wildlife refuges.

In its social and economic phases, Federal reclamation has made outstanding contributions to the progress of the West and to the Nation. The economy of substantial areas of 15 States in which one or more projects are operating has been stabilized. No small part of the 300 percent increase in the population of the West since 1900 can be traced to the operation of the reclamation program. State and local governments and institutions have been bolstered by new stable developments resulting from this program.

On the 50,000 irrigated farms created by the program and in the 254 cities and towns dependent on them live 900,000 persons. Expenditures made in construction of the projects have been widely distributed. The purchasing power of the developed project areas fulfils the prediction that reclamation of the arid lands would broaden the market for the manufactured goods of the industrial centers to the eastward.

Such staple crops as are grown in other areas are produced on reclamation projects in inconsequential quantities. Irrigated agriculture bears a complementary rather than a competitive relationship to the agriculture of humid regions. Approximately 50 percent of the products of reclamation are fed to livestock in the immediate areas. Other produce includes many specialty crops. Much of the foodstuffs grown is consumed in the West or is marketed eastward only during periods when similar produce from farms near the large consuming centers is not in season.

NATIONAL IRRIGATION POLICY—ITS DEVELOPMENT AND SIGNIFICANCE

CHAPTER I. WHY IRRIGATION?

Why is it necessary to irrigate farms in the West?

To one familiar with the West this may seem to be a foolish question, but it is asked so often by those who do not know western conditions and who are sincerely puzzled that it deserves an answer.

Geography books at one time in general use in our schools labeled all the West as "The Great American Desert." In truth most of this territory would be included in the best definition¹ of the term—a desert is "a barren tract incapable of supporting any considerable population without an artificial water supply, and almost destitute of moisture and vegetation."

West of the one-hundredth meridian lie in excess of 740,000,000 acres—more than one-third the land area of continental United States—which receives on the average less than 20 inches of rain a year. In excess of 150,000,000 acres of this total receive an average of less than 10 inches of moisture a year.

With regard to precipitation, as related to agriculture—
says the Department of Agriculture—

the United States may be divided into an eastern and a western part. The dividing line roughly coincides with the one-hundredth meridian in the vicinity of which the average annual rainfall is about 20 inches. In general, east of this line precipitation is usually sufficient for crop production by ordinary farming methods, but in the West large areas have deficient rainfall, necessitating for crop growth, special methods for artificially supplying moisture or for conserving it in the soil. The minimum amount of rainfall needed for ordinary farming, *under favorable seasonal distribution*,² is usually considered to be about 15 inches in a relatively cool climate where the mean summer temperature is about 65°, and 20 to 25 inches in areas where the mean summer temperature is 75° to 80°. This difference in requirements is due largely, of course, to evaporation from the soil, transpiration from plants, etc., more pronounced in warmer climates.

SEASONAL DISTRIBUTION OF RAINFALL

It should be noted that both the total rainfall and the distribution of the rainfall among the seasons are important to successful farming without irrigation.

Two maps have been prepared to illustrate the average annual precipitation characteristics of various sections of the United States, and to show the percentage of the total precipitation which is received on the average in various areas during the period from April 1 to September 30 of each year, the ordinary growing season for crops.

¹ Webster's New International Dictionary.

² Italics supplied.

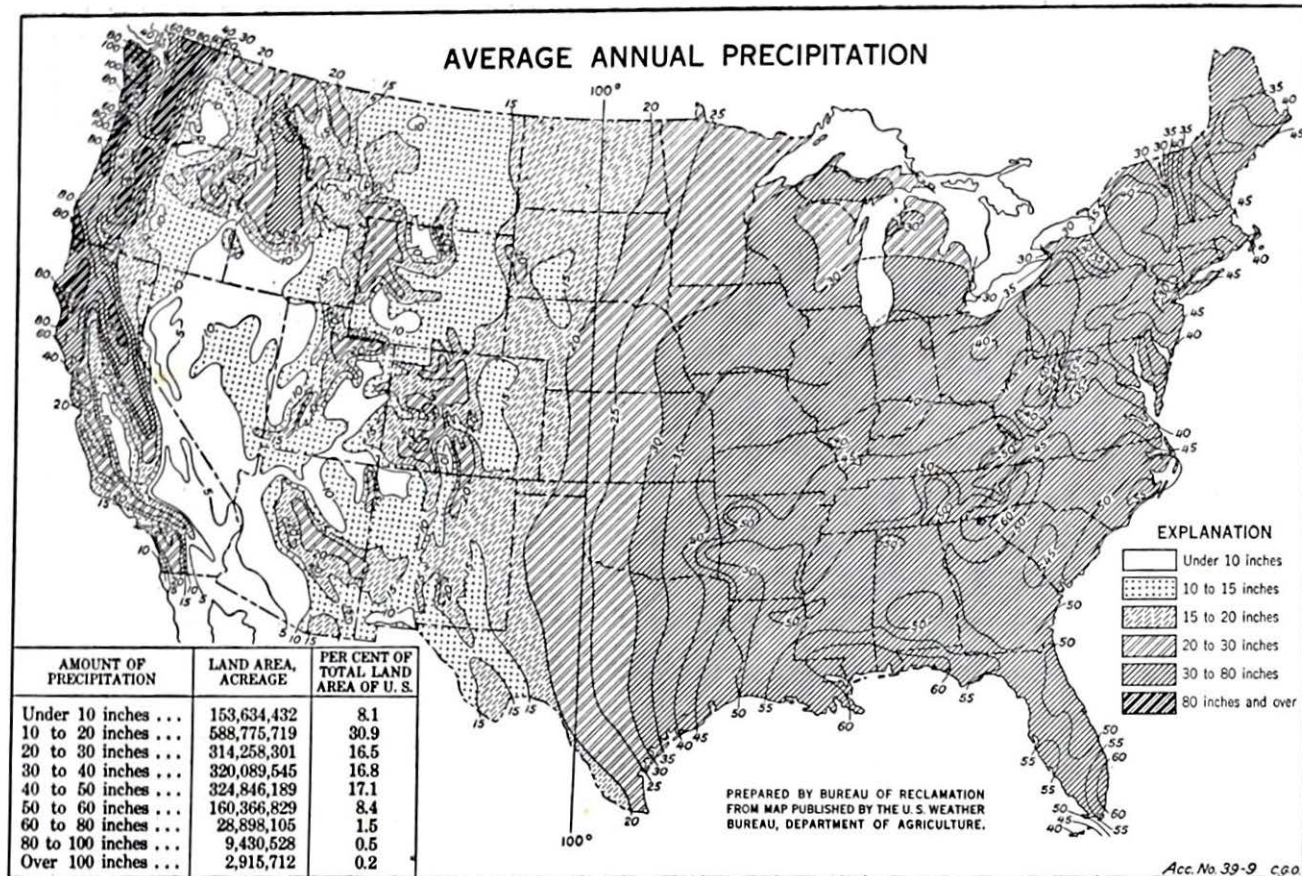


FIGURE 1.

Figure 1 shows clearly how the United States is divided into two parts by the 20-inch rainfall line, which roughly follows the one-hundredth meridian, with sufficient rainfall to the east of this line for crops and, for the most part, with insufficient rainfall west of this line for unirrigated crops. To the west of the one-hundredth meridian, except for high mountains and a strip along the northern Pacific coast, less than 20 inches can be expected in a normal year. Those tremendous areas shown as receiving 15 inches or less of rainfall are true deserts. These arid lands and the semiarid lands, which receive between 15 and 20 inches, taken together, include all of Nevada; and all but mountainous areas in Arizona, New Mexico, Colorado, Utah, Wyoming, Montana, and Idaho; all but small patches, principally mountainous, of the three Pacific Coast States, Washington, Oregon, and California; and the western parts of those States of the Great Plains, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.

All Federal reclamation projects are located in areas shown by this map to receive on the average less than 20 inches of rainfall annually. Virtually all the irrigation practiced in the United States is confined to this area. Of the 742,410,151 acres which are arid or semiarid only about 20,000,000 acres are irrigated by private, cooperative, and Federal projects, combined. Some irrigation for special crops, such as rice, is practiced in areas with humid climates, as for example, in Louisiana, but for the purposes of this discussion, irrigation in humid regions is not included.

If 20 inches of rainfall, or even if 15 inches, could be counted upon during the growing season for crops in these Western States, irrigation might not be required. It is important, therefore, to investigate the seasonal distribution of rainfall in the West to determine the prospects in the average year during the period April 1 to September 30.

Figure 2 shows the percentage of the average annual rainfall which is received during the growing season for crops. The greater part of California is shown to receive less than one-fifth of its average annual rainfall during the growing season; in a second band covering most of Washington and Oregon, and parts of Idaho, Nevada, California, and Arizona, only about one-third of the total falls in the growing season; in the third band, covering the whole central part of the West, between 40 and 60 percent is received in the growing season; while the next band, covering the middle part of the United States, is more favorably treated by the weather and receives more than 60 percent of its rain when it is most needed for the growth of crops.

Considering these two Figures together, it will be noted that from the Continental Divide westward, virtually nowhere but in high mountains which cannot be farmed anyway, can more than 8 or 10 inches of rain be expected during the period from April 1 to September 30, the period when moisture is most needed for crop growth. Between the Continental Divide and the one-hundredth meridian in only a few tillable areas can as much as 15 inches be anticipated during the growing season.

In other words, not only does the area west of the one-hundredth meridian, for the most part, receive less than 20 inches of rainfall in the normal year, but also the moisture which does fall there is un-

favorably distributed through the seasons so far as agriculture is concerned.

Remembering the statement by the Department of Agriculture, that between 15 and 25 inches of rain, depending on summer temperatures, are necessary during the growing season for farming without irrigation, it readily can be seen that irrigation is essential to farming in virtually all the West.

FARMING DEPENDENT ON IRRIGATION

In humid sections farming is a term denoting all types of agricultural pursuits. In the West this word is supplemented by such terms as "ranching," "dry-farming," and "irrigation." In the arid and semiarid sections, irrigation farming alone is comparable to the general farming common to the humid sections.

Dry-farming, that is farming without irrigation, is a precarious operation. Except for wheat, few crops have been successfully grown by dry-farming in the West. Small, isolated areas are exceptions. Even wheat production by dry-farming methods is uncertain, since favorable spacing of winter and spring storms are necessary to mature the crop. In many localities where dry-farming is practiced extensively the farmers consider themselves fortunate if 1 crop in 3 mature, and in some sections the average is 1 crop in 5.

Ranching, although the term is used loosely even in the West, usually denotes a type of agriculture unknown in humid sections. Livestock is the principal product. Little or no soil is tilled. The stock is grazed on the ranch and on public lands in the vicinity, feeding on the natural grasses produced by the scant rains. A cattle or sheep ranch may have an irrigated hay meadow, from which winter feed is cut. These meadows usually lie along streams, and the hay produced is ordinarily cut from natural grasses, although some meadows are well enough watered by the streams or by irrigation to produce alfalfa. In ranch country often the carrying capacity of the range is no more than eight head of cattle for each section of land.³

Both dry-farming and ranching, of course, are types of agricultural pursuits. Irrigation is necessary, however, in the arid and semiarid sections for general, cultivated agriculture.

Few areas in the arid and semiarid West are dry-farmed, except in the Great Plains. The recent extended drought in the Great Plains, with its consequent uprooting of tens of thousands of farm families, has served to demonstrate the precariousness of this type of agriculture. The President's Great Plains Committee,⁴ and others who have studied the situation there recommend introduction of new land-use programs which largely would eliminate dry-farming in the Great Plains.

Ranching, if the term be used, as here, as synonymous with cattle and sheep raising in the ill-watered areas, is a more stable type of agriculture, and also one practiced much more widely in the arid and semiarid section. In excess of 300,000,000 acres are given over to grazing. The livestock industry, founded on ranching, is one of the

³ The Division of Grazing of the Department of the Interior gives as the amount of grazing land needed for pasturing each head of cattle in the West a minimum of 12 acres (in North Dakota) and a maximum of 320 acres (in Arizona).

⁴ The Future of the Great Plains, report of the Great Plains Committee, December 1936.

most important, if not the most important, in the West. Because of the great disparity between the areas devoted to grazing and those irrigated, it is important to note that approximately half of the feed units needed by the livestock industry comes from the irrigated lands. There is, therefore, a direct, complementary relationship between ranching and irrigation farming in the arid and semiarid section.

Dry farms encompassing one or two thousand acres are not uncommon. Ranches may include 1 section or 100,000 acres, as do some in Texas, but regardless of their size, those in States where public grazing lands exist are but headquarters for livestock operations on the public pastures. Irrigation has made possible the subdivision of holdings and the establishment of farms on tracts of from 10 to 160 acres in extent, each capable of supporting a family.

Irrigation is essential to general farming in the arid and semiarid section, and is the only means of providing for close settlement of rural areas in more than one-third of the land area of continental United States.

CHAPTER II. THE BEGINNING OF FEDERAL RECLAMATION

When the writing of history began irrigation had already been established. The British Society of Anthropology accepts as its fundamental doctrine that historically civilization was created as the result primarily of the invention of irrigation.⁵

Queen Semiramis, an ancient Assyrian ruler, who was supposed to have lived more than 4,000 years ago, has been given credit for directing her government to divert the waters of the Nile to irrigate arid lands. Inscribed on her tomb are these words:

I constrained the mighty river to flow according to my will and led its waters to fertilize lands that had before been barren and without inhabitants.

Ever since, irrigation dams and main canals in Egypt have been built by the national government. Irrigation canals supposed to have been built under Queen Semiramis are still delivering water.

The fall of ancient civilizations built on irrigation—notably in the valleys of the Tigris and the Euphrates—is often ascribed to economic disintegration resulting from the failure of irrigated agriculture to stand the test of time. Study reveals that if the break-down of these civilizations had direct connection with agriculture, it is traceable in some instances to the destruction of irrigation works by hostile armies and in others to failure to overcome the destructive effects of salt accumulation through provision of adequate drainage, or to silting of canals or inability to stop incursions of blow sand.⁶

As against such failures, however, there stands the record of continuous irrigation for thousands of years in the valleys of the Nile and comparably long periods in Syria, Persia, India, Java, and some parts of Italy.⁷

IRRIGATION IN THE UNITED STATES

The history of irrigation in the United States is much shorter. Utah, with 92 years of irrigation experience, has not a deserted village.

⁵ A New Deal for Reclamation, J. Rupert Mason, San Francisco. Reclamation Era, February 1935, p. 26.

⁶ *Ibid.*

⁷ Report on Federal Reclamation to the Secretary of the Interior, by John W. Haw and F. E. Schmitt, December 1934, p. 80.

Prehistoric Indians of the Southwest practiced irrigation. Early Spanish missionaries who came over the Mexican deserts into what is now western United States brought from their Mediterranean homes knowledge of irrigation. They watered from the streams gardens and fields around their missions.

On July 24, 1847, followers of Brigham Young broke some of the desert land in the Salt Lake Valley of Utah. The very next day they diverted the waters of City Creek, irrigated the plowed land, and planted potatoes. This, it seems, was the first bit of irrigation ever undertaken by Anglo-Saxons.⁸

Of the arid and semiarid region, Mr. John C. Page, Commissioner, Bureau of Reclamation, Department of the Interior, said:

Most of the slight water supply was received in the winter months, and, with the coming of spring, it collected into a few streams and ran off, without benefit to mankind, to the sea. Only through the damming of streams, the storage of spring floods and their distribution through canals could a little of the land be made productive and be made to support a considerable population.

As the receding frontier drew the American people westward, they came upon the arid and semiarid region, trapped it for fur, explored its mountains for metals, and cut into its forests; but they passed rapidly over its deserts. They crossed miles upon miles of arid lands hoping to find fresh fields; they pressed onward until they realized it was upon the foundation of this desert that the permanent civilization of the West must be built. Then they began the easy stream diversions and irrigated low valleys and the benches near the big rivers. Gradually the irrigation systems became more complicated. Finally, the unregulated flow of the streams became insufficient to the needs of developments relying upon them, and storage works were required.⁹

Prior to 1860, the United States Census Bureau reports that 752 irrigation enterprises, supplying water to 402,237 acres, had been built. In following decades private initiative and cooperative effort increased the area under irrigation until about 9,000,000 acres had been brought under cultivation by 1902. An investment of a quarter of a billion dollars had been made by private capital in enterprises designed to carry water from the few available streams to the thirsty land.¹⁰

RECLAMATION AS NATIONAL POLICY

The young States of the West, with limited populations and large areas untaxable by reason of Federal ownership, were without monetary resources to undertake the needed irrigation program. Problems connected with the use of the waters of interstate streams also deterred development by individual States.

Surveys had been authorized from time to time by the Congress and in the latter 70's, following an extensive examination of the rivers of the West, Maj. John Wesley Powell reported on the possibilities of irrigation.

In 1894, the Congress recognized the need of assisting irrigation development and the Carey law was enacted under which areas of public lands were ceded to States for development by private capital. No funds were furnished by the Federal Government and the results of the Carey Act were not generally satisfactory. No extensive developments were made.

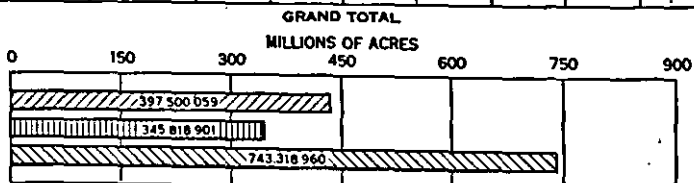
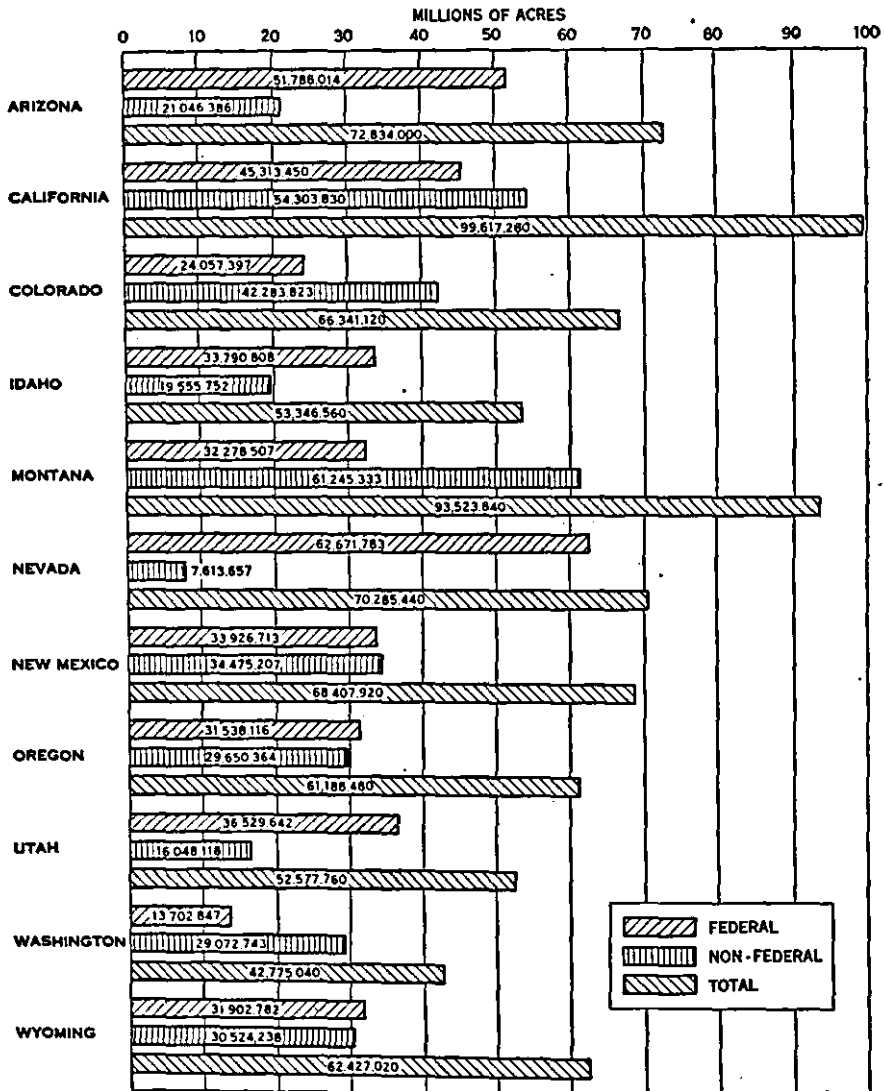
⁸ Conservation in the Department of the Interior, by Ray Lyman Wilbur and William Atherton Du Puy, 1931, p. 9.

⁹ Reclamation Fulfills Its Mission, John C. Page, Reclamation Era, July 1933, p. 126. See appendix 8 p. 58.

¹⁰ See appendix 4, p. 42.

NATIONAL IRRIGATION POLICY

UNITED STATES DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 Federally-Owned Land in Eleven Public Land States
 Compared with Non-Federal Holdings
 As of 1935



The great drought of 1890, which seriously affected agricultural operations in the Great Plains area, increased national interest in irrigation. Toward the latter part of the same decade, the attention of eastern and midwestern business and industrial interests that were seeking new markets for manufactured products in foreign lands was directed to the purchasing power that had been created by the settlement of more than 4,000,000 persons in the area west of the one hundredth meridian. The growth of the West had been largely keyed to its irrigation development. Taking the 11 States of the Mountain and Pacific groups as an example, the census records show that as more land was brought under irrigation, the population increased. Since the advent of Federal reclamation this relationship has been more clearly demonstrated. The possibility of developing new home markets, through irrigation in the West, won wide support for a plan for Federal participation during the period from 1890 to 1902.

A campaign of education, Nation-wide in its character, was inaugurated; sectional prejudice was broken down; and by the time the national party conventions were held in 1900 there was a much better and more widespread understanding of the problems of the West. Each of the major political parties of the day wrote endorsements in its national platform as follows:

Republican: In further pursuance of the constant policy of the Republican Party to provide free homes on the public domain, we recommend adequate national legislation to reclaim the arid lands of the United States, reserving control of the distribution of water to the respective States and Territories.

Democratic: We favor an intelligent system of improving the arid lands of the West, storing the waters for the purpose of irrigation, and the holding of such lands for actual settlers.

Silver Republican: We believe the National Government should lend every aid, encouragement, and assistance toward reclamation of the arid lands of the United States * * * and we believe it to be the duty of the General Government to provide for the construction of storage reservoirs and irrigation works * * *.

CHAPTER III. THE RECLAMATION LAW OF 1902

Proposals to the Congress for the establishment of a national irrigation policy had not come from the West alone. The late Abram S. Hewitt, of New York, and other far-seeing statesmen had recognized the problem and the necessity for national action. Western Senators and Representatives all urged the use of Federal funds, but were unable to agree on many details; and the remainder of the country awaited a definite plan.

When Theodore Roosevelt came to the White House in 1901, he brought a first-hand knowledge of the conditions in the West, tempered by his associations in the East. As a young man in delicate health he had gone West and "there saw with his own eyes the marvels of irrigation on soil that was called desert."¹¹

In his first message to the Congress in December of that year, he outlined his views in characteristic fashion. He anticipated many of the objections and arguments that were then being presented and which have since been used against Federal participation in the reclaiming of the arid lands of the West.

With the subject removed from the field of partisanship by the action of the three national political conventions, the way was paved

¹¹ Reclaiming the Arid West, George Wharton James, 1917, p. 19.

for consideration of legislation on its merits. Representative Francis G. Newlands, later a Senator from Nevada, who had long been interested in the subject, had introduced a bill, the major principles of which President Roosevelt endorsed.

After much debate the bill was passed on June 3, 1902, receiving a vote of 146 to 55 in the House of Representatives and little serious opposition in the Senate. It was approved by the President on June 17, 1902.

MAJOR FEATURES OF ACT

In its major features, the law was designed as a means of aiding the West to help itself. It established the reclamation fund. Into this fund certain proceeds of the sale of public lands were to be deposited on account for investment on approved reclamation projects in the West. These projects were not to be gifts, but the costs of their construction were to be repaid by settlers on the reclaimed land. The one concession, reflecting the national interest in the program, was that the costs were to be returned without interest. Subsequent legislation has enlarged the sources of increments to the fund, but the principle of repayment and the principle of reinvestment in further construction have been retained.

The act assigned reclamation as a duty of the Secretary of the Interior, who was authorized to investigate and construct feasible irrigation projects. The Secretary originally was authorized to disburse the fund without appropriation by the Congress, but this authority was withdrawn by the Extension Act of 1914, and since that time only sums specifically appropriated by the Congress have been expended from the reclamation fund.

While the law provides for the return to the reclamation fund of the full expenditure without interest—

it is concluded that Congress did not intend reclamation to be a philanthropy, or a means of dissipating the reclamation fund, or returning it to the States in which it originated, but that, on the contrary, it intended reclamation to be a nationally supported agency of irrigation development on an economically and socially desirable basis, for the purpose of building up the whole West in the national interest as fully as the natural resources would permit.¹²

Under more recent amendments to the Reclamation Act, repayments by water users on irrigation projects constructed with funds from the General Treasury go to the reclamation revolving fund to be used for further construction. A part of the proceeds of oil and other mineral royalties from public lands, and from Federal power licenses likewise supplement the fund under legislation now nearly 20 years old.

WARREN ACT OF 1911

An amendment to the original law in 1911 known as the Warren Act authorized the sale of surplus water from Federal project works to provide supplemental water supplies for lands already irrigated. Operations under the Warren Act have expanded Federal reclamation activities. The stabilization of areas already developed but insecure because of insufficient or unreliable water supplies has become as vital to the West and to the Nation as the development of additional desert areas for farming.

¹² Schmitt-Haw Report to Secretary of Interior, *op. cit.* p. 24.

Under the authority of the original act, reclamation first was placed under the Geological Survey, but later it became a separate activity conducted by the Reclamation Service, which was set up to administer the program. In recent years the Reclamation Service has been reorganized as the Bureau of Reclamation of the Department of the Interior.

When Federal reclamation was launched in the summer of 1902, "high hopes were held that important and lasting benefits would be derived from the conservation of the arid soils and scant waters of the West. It was hoped that new opportunities to gain an American standard of living could be made available to large numbers of people who might find homes on the reclaimed land; that the natural handicaps of the big Western States could, in part, be overcome through the construction of soundly planned irrigation works with public funds on a self-liquidating basis; and that through building homes and communities the United States could be made a better and a richer country."¹³

Reclamation has received general approval¹⁴ as shown by the following statements:

PRESIDENT THEODORE ROOSEVELT'S POSITION

In his first message to the Congress in December 1901, President Theodore Roosevelt declared:

It is as right for the National Government to make the streams and rivers of the arid region useful by engineering works for the storage of water as to make useful the rivers and harbors of the humid regions by engineering works of another character.

* * * * *

The reclamation and settlement of the arid lands will enrich every section of our country just as the settlement of the Ohio and Mississippi Valleys brought prosperity to the Atlantic States.

The increased demand for manufactured articles will stimulate industrial production, while wider home markets and the trade of Asia will consume larger food supplies and thus effectually prevent competition with eastern agriculture.

Indeed the products of irrigation will be consumed chiefly in mining and other industries which would otherwise not come into existence at all.

Our people as a whole will profit for successful homemaking is but another name for upbuilding of the Nation.

PRESIDENT TAFT APPROVED PROGRESS

Progress of the reclamation program was praised by President William Howard Taft in an address at Spokane, Wash., September 29, 1909, 7 years after the Congress had enacted the law. In one address on conservation he said:

The plan of the Government to reclaim the arid and semiarid lands manifested in the Reclamation Act has been carried out most rapidly by the bureau charged with its execution. There are more than 30 projects which have been entered upon by the Reclamation Bureau, and I believe all of them are to be commended for their excellent adaptation to the purpose for which they were erected, and for the speed with which the work has been done. * * *

The work has been well done and reflects credit on the engineers that have had charge of it.

¹³ "Reclamation Fulfills Its Mission", *Reclamation Era*, July, 1938.

¹⁴ See appendix 6, p. 54.

PRESIDENT HARDING FOR EXPANSION

President Warren G. Harding, in a message to the Congress on December 6, 1921, suggested expansion of reclamation:

There is yet unappropriated approximately 200,000,000 acres in the public domain, 20,000,000 acres of which are known to be susceptible of reclamation and (being) made fit for homes by provision for irrigation.

The Government has been assisting in the development of its remaining lands until the estimated increase in land values in the irrigated sections is full \$500,000,000 and the crops of 1920 alone on these lands are estimated at \$100,000,000. Under the law authorizing these expenditures for development the advances are to be repaid, and it would be good business for the Government to provide for reclamation of the remaining 20,000,000 acres, in addition to expediting the completion of projects long under way.

Subsequently on July 22, 1923, at Spokane, Wash., President Harding, speaking on "Development, reclamation, and water utilization," called attention to the possibilities of multiple uses of water in connection with irrigation and power developments:

Our whole view of the relation of water to western development has changed much in the last generation.

Only a few years ago these waters were looked upon as potentially useful merely for irrigation and agriculture. We entered upon a great program of irrigation enterprise in that era when we had but a vague notion about the dual purpose that water resources ought to serve.

But, now we know that the same water can, in most cases, be utilized both for power and irrigation.

PRESIDENT COOLIDGE ENDORSES PROGRAM

President Calvin Coolidge, in a letter to the president of the American Mining Congress, September 17, 1924, gave reclamation his endorsement thus:

Some minor criticism has been made as to the policy of our unremitting development of these (reclamation) projects by those who have thought we were already overproducing in agricultural products. They feel that these projects should be stayed until agricultural production had readjusted itself.

These criticisms lie in the lack of understanding that these projects take many years for development; that they furnish but a small portion of the increased food supply required even by our increased population; that the utilization of their supplies lies in the development of the West itself.

It is my purpose to unremittingly stimulate and encourage the development of these projects by every authority of the Federal Government.

PRESIDENT HOOVER SEES NATIONAL BENEFIT

President Herbert Hoover, in a letter to Western Governors in conference at Salt Lake City, June 30-July 2, 1930, took cognizance of the national significance of reclamation.

The undertaking (reclamation) has been of great benefit to this region (the West) and has been the cause of adding much wealth to the Nation.

If the fundamental facts are properly appraised, it seems certain that the arguments of opponents of Federal reclamation will find satisfactory answer and that they will no longer countenance the misleading information that is now being broadcast through different agencies.

Only 1 percent of the farm commodities raised in the United States are produced on Federal reclamation projects and 90 percent of the quantity so produced is locally consumed.

The projects themselves furnish extensive markets for manufactured goods as well as for farm products not raised under irrigation, and thus seem to afford material benefits, rather than detriment, to other sections. It may be further

said that crops raised under irrigation are generally supplemental to, rather than competitive with, the products of other farms.

* * * No valid arguments appear to oppose this constructive Federal undertaking. Rather support should be given in the light of the contribution to the Nation's good.

PRESIDENT FRANKLIN D. ROOSEVELT ON THE SUBJECT

In his Constitution Day address in Washington on September 17, 1937, President Franklin D. Roosevelt enunciated a dominating theory of the principles he has expounded in dealing with the problems affecting reclamation:

In our generation, a new idea has come to dominate thought about government—the idea that the resources of the Nation can be made to produce a far higher standard of living for the masses if only Government is intelligent and energetic in giving the right direction to economic life.

At Grand Coulee Dam, Wash., on October 2, 1937, the President gave practical emphasis to this viewpoint:

I look forward to the day when this valley, this basin, is opened up, giving the first opportunity to these American families who need some good farm land in place of their present farms. They are a splendid class of people and it is up to us as a nation, to help them to live better than they are living now. * * *

There is just one other word that is worth saying from the national point of view: We think of this (Grand Coulee Dam) as something benefiting this part of the country primarily, giving employment to a great many people in this neighborhood. But we must remember one-half of the total cost of this dam is paid to factories east of the Mississippi River * * *.

In a message to the National Reclamation Association at Boise, Idaho, in November 1933, he wrote:

Reclamation as a Federal policy has proven its worth and has a very definite place in our economic existence. Spread over one-third of the territory of the United States and creating taxable values and purchasing power affecting municipal, State, and Federal Governments and private industry, it is only reasonable that we should all take pride in its achievements and success.

At the dedication of Boulder Dam, September 30, 1935, he called attention to the national benefits arising from construction work of this type:

We have helped mankind by the works themselves and, at the same time, we have created the necessary purchasing power to throw in the clutch to start the wheels of what we call private industry. Such expenditures on all of these works, great and small, flow out to many beneficiaries. They revive other and more remote industries and businesses, money is put in circulation, credit is expanded, and the financial and industrial mechanism of America is stimulated to more and more activity.

At Cheyenne, Wyo., September 24, 1937, President Roosevelt took issue with the assertion that the reclamation program—

would make available unnecessary farm lands and that there are enough good farm lands in the United States to take care of all the people who need them for 50 years to come.

You and I know this is not so—

he added.

You here * * * know of the number of people—families—who have had to leave their farms in the drought area * * * people who could not make a go of it on poor land, families forced to leave their homes to avoid starvation. These people have come farther west looking for a chance to earn a livelihood, looking for good land and not being able to find it.

* * * So, for all of these families, I believe it is the duty of the Federal Government and the State governments to provide them with land where it is possible to do it, where they can make a living.

And at Bonneville Dam, November 18, 1937, the President added:

If, for example, we had known as much and acted as effectively 20, 30, or 40 years ago as we do today * * * we could have prevented in great part the abandonment of thousands of farms in portions of 10 States and thus prevented the migration of thousands of destitute families from those areas into the States of Washington and Oregon and California.

To the National Reclamation Association in November of that year he sent this message:

The program under the Federal reclamation policy has steadily gone forward and has relieved unemployment not only in the West, but in the industrial East where these western developments create a market for the products of factories. * * * The prolonged drought has given added emphasis to the benefits of irrigation.

In further support of the national aspects of the reclamation policy, in November 1937, President Roosevelt wrote to the same organization:

Well planned and expertly engineered, a new Federal project is a good investment for the Government. Under the reclamation law the cost of its construction must be repaid to the Federal Treasury. Once completed the project continuously is productive of new wealth, enriching our communities, our States, and our Nation.

Realizing the possibility of an apparent conflict between the crop control policy and the furtherance of reclamation, President Roosevelt in a "fireside chat" on October 13, 1937, explained the different objectives:

Crop surplus control relates to the total amount of any major crop grown in the whole Nation on all cultivated land, good or bad—control by the cooperation of the crop growers with the help of the Government. Land use, on the other hand, is a policy of providing each farmer with the best quality and type of land we have or can make available for his part in that total production. Adding good new land for diversified crops is offset by abandoning poor land now uneconomically farmed.

Referring to the progress the general water conservation program, including reclamation, is making President Roosevelt in October 1938, in a letter to Mr. O. S. Warden, president of the National Reclamation Association, emphasized further the fulfillment of the original purposes of the Federal reclamation program:

The providing of new opportunities to make homes and gain decent livings for a large number of our farmers through irrigation of western deserts serves to increase the wealth of the Nation and to cement us economically into a more perfect whole.

I have felt concern for the large number of families which have been forced by drought and adversities from their homes in various sections. The construction now in progress in the West will, in part, solve the problem.

The fact that these projects are expected to repay the cost of their construction, through revenues from water and from power, when power is possible of development, is not to be overlooked nor underestimated. This makes it possible for me to justify expenditures on a scale commensurate with the needs for such work.

The scores of dams, the thousands of miles of canals, the many power plants, and the thousands upon thousands of homes which have resulted from Federal reclamation are monuments to the sound plan which is being so ably executed by the Department of the Interior through the Bureau of Reclamation.

SECRETARY HAROLD L. ICKES REVIEWS PROGRESS

The Secretary of the Interior, Harold L. Ickes, reviews the progress and predicts a promising future for reclamation in his speech entitled "Conquering Climate," which he delivered at the Seventh Annual

Convention of the National Reclamation Association at Reno, Nev., October 13, 1938.

These * * * important projects now under construction hold a great promise for the West. In years to come the power from their dams and the water from their reservoirs will work side by side in arid valleys to create new empires rivaling those which already, in like manner, have sprung from the sagebrush. They will support homes, farms, and cities and bring renewed hope to hundreds of thousands. Prosperous new communities will take their place within these States and pour additional wealth into the trade channels of the whole Nation.

These things we have a right to predict, knowing as we do from the records of reclamation that similar achievements have resulted from other projects. They have already translated dreams into reality.

Adhere to a sound and wise reclamation program and you will protect the future of the West.

CHAPTER IV. SOME NATIONAL BENEFITS OF RECLAMATION

The prediction of President Theodore Roosevelt that reclamation would "enrich every section of our country just as the settlement of the Ohio and Mississippi Valleys brought prosperity to the Atlantic States,"¹⁵ was followed 30 years later by President Hoover's statement that reclamation projects "furnish extensive markets for manufactured goods as well as for farm products not grown under irrigation."¹⁶

The widespread distribution of expenditures for construction is an important phrase of the national benefits accruing from reclamation developments. Each project area continually affords a market for the industrial products of the Midwest, the East, and the South, while at the same time it purchases quantities of foodstuffs grown and processed in other areas.

Surveys of wholesale purchases made for typical project areas show that from 50 to 80 percent of the incoming shipments is produced in areas outside of the reclamation States.

The Washington State Planning Council, following a survey of the Yakima Valley, center of extensive Federal reclamation operations, commented:

It appears that of some \$50,000,000 of new wealth produced in the Yakima Valley, every year, fully one-half goes directly or indirectly to eastern industry and agriculture for their products.¹⁷

The Repayment Commission of 1937-38, in a report to Secretary of the Interior, Harold L. Ickes, subsequently transmitted to the Congress, estimated that the wholesale value of nonwestern products shipped to all of the project areas of the West exceeded \$209,000,000 annually, an amount approaching the construction cost of the projects in operation at that time.¹⁸

A survey by the Idaho State Planning Board of incoming railroad shipments received at stations of the Boise project area in 1937 made possible an estimate of the market for nonwestern products the Federal reclamation projects of the West afford.

¹⁵ Message to Congress, December 1901.

¹⁶ Letter to western Governors, Salt Lake City, Utah, June 30-July 2, 1930.

¹⁷ Reclamation—A Sound National Policy—Washington State Planning Council, 1936.

¹⁸ House Document No. 673, 75th Cong., 3d sess.

PROJECT AREAS AS MARKETS

The Boise survey, listing the incoming commodities received in carload lots, revealed that more than 300 carloads of foodstuffs were shipped to the area in that year from States as far east as Massachusetts and New York and as far in the southeast as Florida. Manufactured goods shipped to the project included automobiles and trucks, tractors, farm machinery and equipment, household furniture, and miscellaneous merchandise from 30 States of the Midwest, the South, and the East.

A check of purchases by typical individual farmers of the Boise and other Idaho projects indicates that approximately 75 percent of their average annual income is expended for the purchase of eastern manufactured articles and products.¹⁹

In support of a treatise on the National Value of the Reclamation of American Lands in the Colorado River Basin, the Gila (Ariz.) Project Association cites the wholesale purchases of manufactured goods in the Federal project areas of that State. Eighty percent of the wholesale purchases, amounting to \$35,125,000, made in the Salt River Valley project area in 1935 included commodities produced east of the Rocky Mountains. Wholesale purchases by Yuma County merchants in the area where the Yuma project provides the major purchasing power totaled \$5,578,300 in 1936 and covered commodities, 80 percent of which was produced in non-Western States.²⁰

The diversified character of the shipments in carload lots to the Boise project is illustrative of the market the projects afford. Shipments originating in a few States are cited as examples.

From Michigan 312 carloads of automobiles and trucks were shipped direct by rail, in addition to automotive equipment manufactured in Michigan but shipped to Idaho from California assembly plants, and in addition to that arriving in Idaho in highway caravans. Food processors in Michigan shipped 29 carloads of cereals; and manufacturers of electrical goods, furniture, and household equipment forwarded more than 50 carloads of their products.

Minnesota found a market for 65 carloads of farm supplies, consisting of building material, household equipment, canned goods, cereals, and fresh meats.

From a State as far east as Pennsylvania came 114 carloads, including shipments of lubricating oils and greases, dry groceries and miscellaneous food supplies, electric ranges, steel and steel products, etc.

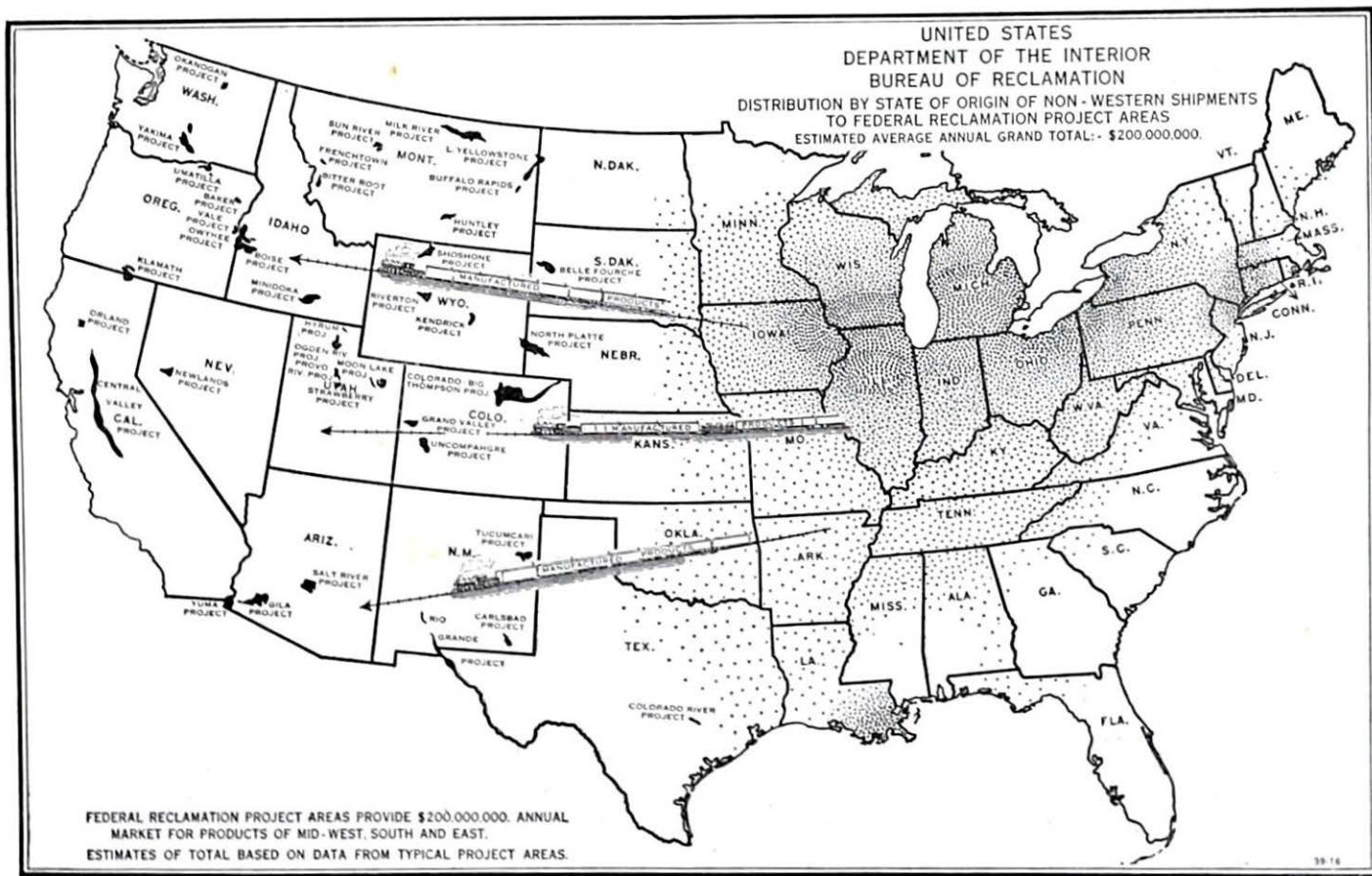
Automobile and truck assembly plants in Missouri shipped 57 carloads of motor vehicles and more than that number made up of cereals and other foods, building material, and miscellaneous merchandise.

Louisiana and Arkansas each shipped 50 carloads of merchandise, including foodstuffs, furniture, building material, and miscellaneous goods.

Citrus fruits, canned goods, and vegetables in carload lots from Florida were recorded; and from Alabama also came miscellaneous food supplies, furniture, and other material.

¹⁹ Nation Benefited by Irrigation, L. H. Mitchell, Reclamation Era, 1936, p. 27.

²⁰ Shall a National Resource Be Wasted, Gila Project Association, 1937.



Connecticut shipped eight carloads of radios, six carloads of washing machines, and other carloads of hardware and general merchandise.

Kentucky forwarded nearly 100 carloads of miscellaneous merchandise, steel and steel products, and building material.

Food processors of Indiana found a market for 25 carloads of canned goods, corn products, and fresh meats, while industrial plants shipped more than 50 carloads of electric equipment, building material, and miscellaneous merchandise.

The industrial plants and food processors of the eastern section of Nebraska found a market on the Boise project for more than 30 carloads of their products.

Ohio, with its diversified manufacturing developments, supplied 134 carloads of industrial products, including agricultural implements and farm supplies, electric refrigerators and general household equipment, building material, and miscellaneous merchandise.

Oklahoma's oil refineries shipped more than 50 carloads of gasoline, lubricating oil, and grease.

The diversified agriculture and industries of Texas provided the Boise area with nearly 150 carloads, including 13 of citrus fruits, 55 of miscellaneous food supplies, 40 of miscellaneous merchandise, and 25 of gasoline and lubricating oils.

The outlet for Wisconsin's industrial plants is shown in the forwarding of 140 carloads of agricultural implements, farm supplies, foodstuffs, furniture and other household equipment, building material, and miscellaneous merchandise.

Sources of supply extend as far to the northeast as Massachusetts which shipped dry groceries, furniture, and building material. New York State provided nearly half a hundred carloads of foodstuffs, building material, and miscellaneous merchandise.

From the South—Mississippi, Alabama, and Tennessee—came food supplies and building material, as well as manufactured articles.

Maryland, North Carolina, Virginia, and West Virginia are included in the list of States forwarding carload lots of industrial products or food supplies to the Boise project.

THE WHOLE WESTERN MARKET

A survey of the market provided for industrial and agricultural products of other sections by the West shows for example, that the 11 Western States bought corn and pork products of the Midwest averaging in value \$210,000,000 annually from 1926 to 1935. The population of these Western States requires three times as much pork based on the average national consumption per capita, as reported by the Department of Commerce, as is produced in the area, according to figures supplied by the Department of Agriculture. The corn grown is scarcely half the quantity consumed.

Although the 11 States of the Mountain and Pacific groups produce more wheat than they consume, they purchase more flour and processed cereals than are manufactured within their areas. It is conservatively estimated that flour and processed cereals worth \$14,350,000 are purchased annually from the milling centers of the Midwest.

After deducting the value of the comparatively small amount of cotton produced on irrigated lands in the West, the annual expenditures in that area for cotton, cotton byproducts, and textiles, in the 10-year period 1926-35 averaged \$97,315,350.

Of the expenditures made for cotton in the West, more than \$21,000,000 went to the planters of the South and the remainder to the textile mills in that area and in the East.

No tobacco is grown on irrigated land or anywhere in the West. Based on the average per capita consumption of 6.09 pounds of tobacco for 1935, the 11 States provide a market for tobacco valued annually at \$81,995,163. In addition to manufactured tobacco, the States import large quantities of spray preparations produced from tobacco.

During the 11-year period from 1925 to 1935, the expenditures in these States for automobiles reflected a factory value of \$221,822,433 each year, according to calculations based on automobile registrations. The population in this area was 9.9 percent of the national total. Automobile registrations from 1925 to 1935 averaged 14.4 percent. From 1925 to 1935, the average number of passenger cars and trucks registered in the 11 States was 3,258,355 and from 1930 to 1935 it exceeded 3,600,000.

Most of the automobiles and trucks sold in the West came from Michigan. Other States which furnished vehicles and accessories included Ohio, Indiana, Illinois, Pennsylvania, Missouri, and New York. Appropriate deductions have been made in this discussion for automobiles, trucks, and accessories assembled in California and other States and distributed thence to the dealers.

COMPARISON WITH EXPORT TRADE

Federal reclamation projects have provided a more stabilized market for the manufactured and agricultural products of other sections of the country than has the export trade of the United States with more than 50 countries, a comparison of crop values with foreign trade statistics reveals.²¹

The average annual crop values on land watered by reclamation project works from 1934 to 1937 were exceeded by the American export trade with only four countries: United Kingdom, Canada, Japan, and France. The 4-year average of exports to Germany approached the crop value level.

During the period from 1934 to 1937 crop values on Federal reclamation projects turned an average of \$110,145,198 into channels of national trade, exclusive of the income of settlers gained from livestock, poultry, and dairy products.

This amount exceeded the value of exports to the Philippine Islands, to Argentina, to Brazil, to China, to all of the Central American countries combined, and to the combined Scandinavian countries, as well as two score other countries.

From 1928 to 1937, the American exports to Brazil decreased nearly 50 percent, while the value of reclamation crops had decreased less than 20 percent.

Exports to Argentina in 1928, when American foreign trade was near its height, totalled \$178,899,000 in value. In 1934, the amount was \$42,688,000 and in 1937, it was \$94,173,000.

While exports to Mexico nearly doubled from 1934 to 1937, the total in the latter year failed to equal the average crop values on Federal reclamation projects.

²¹ Annual Report of Secretary of the Interior 1925, 1936, 1937, 1938; United States foreign trade by countries, World Almanac, p. 353.

American export trade with China dropped from \$68,667,000 in 1934 to \$49,697,000 in 1937.

The crop values on land supplied with water by Federal reclamation projects represent the minimum gross income of settlers. They do not include values added by packing, transportation, or processing the products.

In addition to the income of the farmers on Federal reclamation projects from crops and other sources, the purchasing power of the project areas is augmented by the income of more than 250 cities and towns created by or dependent on the Federal reclamation program. The population of the cities and towns in these areas is 650,826 compared with 222,681 on the farms within the projects.

Export values include the cost of production, processing, and transportation to shipside or at border delivery points. The value of the stable home markets created by Federal reclamation projects is apparently much more important to American business interests, therefore, than the "open door" to China, for example, or the export trade with many other lands.

DISTRIBUTION OF INSURANCE PREMIUMS

Two out of every three dollars of new wealth created in the West and used for insurance goes east of the Mississippi River.

For the year ending December 31, 1936, the net premium income reported to the commission of insurance for all companies doing business in Washington was \$65,682,215.18.²²

Of this total, the net income of Washington companies was \$7,242,208; of other companies west of the Mississippi River, \$9,276,330; and of companies east of the Mississippi, \$49,163,676.

If the insurance transactions of the other 10 States of the Mountain and Pacific groups should be apportioned on the same basis, companies east of the Mississippi River would have an annual net premium income from this section of \$373,643,937.

The net losses paid in Washington for the same year totaled \$22,327,275.10, of which \$16,775,036.83 was paid by eastern companies.

CHAPTER V. RECLAMATION AND THE WESTERN STATES

Major contributions of Federal reclamation to the economic and social development of the 15 Western States in which projects are operating include:

1. Creation of more than 50,000 irrigated farm homes on project land and protection for 30,000 more on land without an adequate water supply.
2. Support for nearly a million persons on the farms and in the 254 cities and towns dependent on these farms.
3. Establishment of 863 public schools and 1,076 churches, construction of hundreds of miles of roads, and other improvements.
4. Values in farm lands and improvements for tax purposes, based on 1937 assessments of typical projects, \$206,537,000; and creation of actual values of more than \$400,000,000.
5. Actual values in city, town, utility, and industrial property and in range land which are benefited; approximately \$500,000,000.

²² Cong. Rec., 75th Cong., 3d sess., p. 3369.

The completion of the program of construction now under way will enlarge greatly the direct and indirect benefits in these States. The above values will be doubled, roughly.

EFFECT ON ASSESSED VALUES

The effect on assessed values of irrigation is seen in the Salt River Valley of Arizona, where is located one of the oldest and most successful Federal projects. In 1937, the assessed values of the farm lands and farm improvements on the project were estimated at \$24,000,000, while all properties within the exterior boundaries of the project were assessed at \$91,375,712. The total values, including those in urban areas, in this instance were nearly four times that of the farm lands and farm improvements alone.

While the Salt River project conditions may be a little unusual because Phoenix, the State capital, is located within the project boundaries, it is illustrative of the related or indirect values flowing from reclamation development. The growth of Phoenix from a sprawling town on the desert 40 years ago to a metropolis is largely credited to the influence of irrigation of surrounding areas.

In the Boise, Idaho, area, the assessed values of real property within the cities and towns approximate that of the farm lands and improvements in the reclamation project.

The Washington State Planning Council reports²² that from 1900-10, following the beginning of the activities of the Bureau of Reclamation in the Yakima Valley, the population of this valley increased 26.2 percent, compared with an increase of 18.8 percent for the State as a whole. From 1910-30, this growth continued, although at a lesser rate. However, in neighboring counties, chiefly devoted to the raising of wheat by dry farming, the population declined steadily during these years.

Largely the answer to this is that reclamation provides an assured foundation for the building of communities and all that goes with them,

the report states.

The certainty of water removes one of the gambles of farming. In the dry-farming areas good crops were obtained for a few years, but with the removal of accumulated moisture and humus production decreased. Wind and water eroded the top soil, laying waste what had previously afforded fair grazing for cattle. Conditions somewhat similar to those which have occurred in the central prairie States were in the making; farms were abandoned, people moved out and the few remaining hung on in the hope that some day their land would be brought under water. Reclamation is definitely a stabilizer of communities.

Of 432,000 acres in Scotts Bluff County, Nebr., 193,000 acres are irrigated in the North Platte Valley, and the remainder is dry farmed or in pasture. In 1909, the year before irrigation began, the assessed valuation of all types of property in the county was \$1,459,555. In 1937, it had increased to \$23,936,605. Irrigated lands are assessed at from \$5 to \$80 an acre; nonirrigated farm land at from \$4.50 to \$9; and pasture lands at from \$1.80 to \$3.60 per acre. For purposes of comparison, conditions in Box Butte County, which adjoins, may be cited. Here only 1.5 percent of the land is irrigated. In 1915 the assessed valuation of all property was \$1,126,500 and in 1936 it had increased only to \$11,663,425.

²² Reclamation—A Sound National Policy, Washington State Planning Council, June 1936.

Just across the State line in Wyoming, the average assessed valuation of irrigated lands in the Goshen district of the North Platte project was \$30 an acre in 1936. Nonirrigated farm lands adjoining were assessed at \$2.35 an acre.

As a basis for estimating assessed values of farm land and improvements within projects or dependent for water in whole or in part on reclamation works, complete data are available from 17 irrigation districts in 11 States. In addition, the average per acre assessment of irrigable or irrigated land in each county in which project land is located, supplemented in some instances by State tax reports, has been provided. Values forecast on completion of the reclamation construction program are based on the 1937 method of assessments.

ESTIMATES OF ASSESSED VALUES

On completion of the construction program as now planned, assessed values of farm land and improvements dependent in whole or in part on project works would be increased from the 1937 level indicated to the figures estimated for each of the following States:

Arizona, from \$27,239,000 to \$43,582,000.
 California, from \$5,000,000 to \$300,000,000.²⁴
 Colorado, from \$7,018,785 to \$50,000,000.²⁵
 Idaho, from \$63,171,150 to \$79,800,000.
 Montana, from \$9,866,606 to \$15,000,000.
 Nevada, from \$4,211,331 to \$7,700,000.
 New Mexico, from \$8,500,000 to \$10,000,000.
 Oregon, from \$6,000,000 to \$12,000,000.
 Utah, from \$33,010,939 to \$45,000,000.
 Washington, from \$17,228,549 to \$100,000,000.²⁶
 Wyoming, from \$8,000,000 to \$19,023,000.
 Totals, 1937, \$206,537,312;²⁷ on completion of program \$689,744,032.

In these States of vast areas the social value of such development is incalculable. Local and State governments and institutions are bolstered. Educational, welfare, and public-improvement programs are made possible on a scale which otherwise could not be approached. The resultant higher standards of citizenship are of national significance.

The internal improvement of these great arid and semiarid States by irrigation has other national phases. The irrigation projects made possible the construction and make possible the maintenance of networks of coast-to-coast communication systems. Railroads, highways, and telephone and telegraph lines use these scattered irrigation projects as piers for bridging the desert. As a result of these communication lines the United States has become a closely knit Nation, despite a handicap which seemed insuperable to Daniel Webster when he first called this area the "Great American Desert."

CHAPTER VI. ACHIEVEMENTS OF FEDERAL RECLAMATION

In reviewing the progress of Federal reclamation, it is possible to present basic facts by which its achievements may be gaged. The

²⁴ The 1937 estimated assessed valuation of \$5,000,000 used here does not include the valuation in areas to be benefited by the Central Valley project and the All-American Canal.

²⁵ The 1937 estimated assessed valuation of \$7,018,785 used here does not include the valuation in areas to be benefited by the Colorado-Big Thompson project.

²⁶ Assessed valuations represent in Washington only about 30 percent of actual value.

²⁷ This total includes estimated assessed values in 1937 of \$17,216,592 in Federal Reclamation projects in Nebraska, North Dakota, South Dakota, and Texas.

program has had both direct and indirect influences on the growth of the West and the development of the Nation.

Recognition by the United States Government of its interest and responsibility in the conservation and utilization of the land and water resources west of the one hundredth meridian reestablished confidence in the future of the West. From 1900 to 1910, the population of the 11 States in the Mountain and Pacific groups increased by more than 2,000,000, and this growth has continued. From 1920 to 1930, the population of these States gained 40.8 percent, greatly exceeding the national average of 15.7 percent. In less than 40 years the population of the West has increased from 4,000,000 to nearly 13,000,000.

The national reclamation policy also stimulated private investment in irrigation enterprises. During the period from 1900 to 1930 approximately \$600,000,000 was expended by private interests and non-Federal agencies in construction of irrigation facilities. The irrigated acreage under private sponsorship was about doubled in three decades. During the period of its operations, Federal reclamation has brought into cultivation 1,700,969 acres²⁸ (the total actually cropped in 1937) and has provided a supplemental water supply for 1,333,800 acres. Projects were prepared to provide water for a total of 3,766,212 irrigable acres,²⁹ although only slightly more than 3,000,000 acres actually received water. Roads, canals, urban developments, farm home tracts, etc., occupy much of the unirrigated but irrigable lands within projects.

From these lands in 1937 there came crop values of \$118,600,000. During the period projects have been in operation the cumulative crop values approximate 2½ billion dollars.

On the project lands wholly dependent on Federal works are 51,834 irrigated farms with a population of 222,681 persons, while in the 254 cities and towns largely dependent on Federal reclamation operations there is an additional population of more than 650,000 persons.³⁰ Including the farms receiving supplemental water and the urban areas dependent on these farms, the population attributable to Federal reclamation exceeds a million.

Any appraisal of the Federal reclamation program recognizes the importance of the remedial work involved in projects that provide supplemental water for areas already irrigated but threatened with destruction by reason of inadequate or unreliable supplies. This phase of the program provides for the stabilization of communities long-established, protects huge investments, and maintains or restores taxable values.

Under the present program, the total irrigable acreage for which Federal reclamation projects will be prepared to provide an adequate, full supply of water can be increased from 2,193,194 to 4,678,914 acres. Of the ultimate total, 1,200,000 acres are included in the long-range development of irrigation on the Grand Coulee project, which will not be completed for more than 20 years.

²⁸ See appendix I, p. 40.

²⁹ See appendix 5, p. 46.

³⁰ Annual Report of the Secretary of the Interior, 1933, p. 68.

In addition to this area which Federal reclamation will have brought into cultivation on completion of the current program, there will be 5,265,443 acres that will have been benefited by supplemental water supplies.

By comparing these figures with the total cropped acreage in the United States, it will be found that on completion of the present construction program the area dependent in whole or in part on Federal works will be less than 3 percent of the total acreage cropped in 1937, while the area now receiving water from Federal irrigation systems is only 1 percent of the total area in production.

Agricultural production has not kept pace with the growth in population in the West. The products of irrigated land are not sufficient to supply all the requirements of the increasing population of the West itself.

CHAPTER VII. RESULTS OF CONSTRUCTION PROGRAM

Nearly a half billion dollars³¹ had been expended to June 30, 1938, by the Federal Government for 50³² Federal reclamation projects, which either had been completed or were under construction at that time. The benefits from construction expenditures on these projects are widespread, and not confined to the State or immediate area in which the particular project is located. Nearly every State in the Union has shared in the expenditures for materials and for labor on and off the site of construction.

The accompanying map, showing the distribution of expenditures for materials on Grand Coulee and Boulder Dams serves as an illustration. Purchases were made in 46 States and the District of Columbia.

Estimates of the distribution of costs on the Central Valley project in California may well provide another illustration of the widespread benefits of the construction of reclamation projects. Based on analyses of reports of the National Industrial Conference Board, the United States Department of Labor, and the California State Chamber of Commerce, 45.4 percent of the expenditures on the Central Valley undertaking will go to States other than California. Like the distribution at Boulder Dam and Grand Coulee, a substantial part of the outlay finds its way to the industrial States of the Midwest, and the East, and the South.

Twenty-nine percent of the expenditures for direct labor on the job in the construction of the Central Valley project will go to the markets of other States for food supplies and other necessities of life.

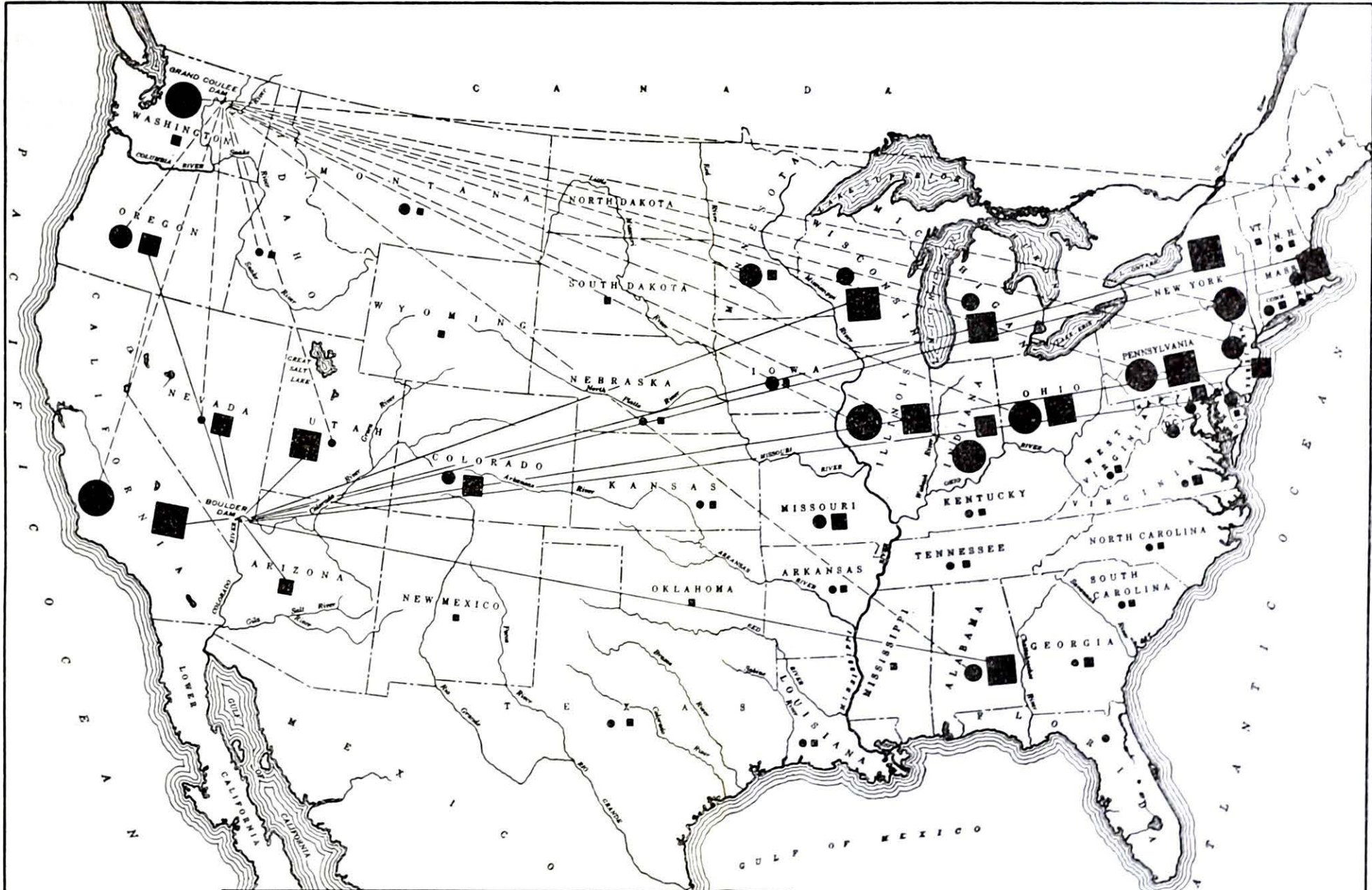
For the All-American Canal construction up to January 1, 1939, industrial States of the Midwest, South, and the East had provided 3,368 carloads of material and equipment. These States included Missouri, Pennsylvania, New York, Illinois, Ohio, Wisconsin, Indiana, Tennessee, Mississippi, and Alabama, among others.

An analysis of the distribution of construction expenditures on Public Works projects shows that for every person employed on the site of a construction job, two or more are given employment in the production of raw materials, in the fabrication of goods, or in the transportation of these materials.³³

³¹ See appendix 4, p. 42.

³² See appendix 1, p. 40.

³³ "P. W. A. and Industry," Bureau of Labor Statistics, Department of Labor, Bull. 468.



EXPLANATION	
GRAND COULEE DAM	BOULDER DAM
● (smallest circle)	■ (smallest square)
● (small circle)	■ (small square)
● (medium-small circle)	■ (medium-small square)
● (medium circle)	■ (medium square)
● (large circle)	■ (large square)
● (very large circle)	■ (very large square)
● (largest circle)	■ (largest square)

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 EXPENDITURES FOR MATERIALS
GRAND COULEE AND BOULDER DAMS
 IN FORTY-SIX STATES
 AND DISTRICT OF COLUMBIA
 TO OCTOBER 1937
 MAP NO. 38-395
 1938

A.M. Smith 7-1-38

EASTERN STATES FURNISH MATERIAL AND LABOR

Data submitted by the General Electric Co.,³⁴ of Schenectady, N. Y., support this statement.³⁵ The company furnished electrical equipment for the Boulder Dam power plant alone which amounted to more than \$4,500,000. The equipment furnished represented more than 2,000,000 man-hours of General Electric labor, required for the design, manufacture, erection, and sale of the electric equipment. The company estimated that labor, including management and sales, amounted to approximately 40 to 45 percent of the selling price. This, of course, did not include labor content in the raw materials going into the equipment and fabricated by others. The number of man-hours involved in the production of raw materials was estimated to be at least equal or greater than the General Electric labor content so that it may be true that 90 percent of funds expended for raw and manufactured material actually goes to labor.

Materials and labor in connection with the equipment for the Boulder Dam power plant came almost entirely from States east of the Mississippi, with the exception of raw copper which probably came from Arizona or Montana, cotton from Texas, and possibly iron ore from Minnesota. The generators were built at the Schenectady factory; the transformers were built at the Pittsfield factory; and the oil circuit breakers were built at the Philadelphia factory.

The company also estimated that nearly 300 cars were required to transport the equipment furnished for the Boulder Dam power plant from the eastern factories to its destination on the Colorado River in Nevada. Raw materials, including coal and oil gathered into the factories, required approximately 500 cars. Each of the large generators had a shipping weight of approximately 2,000,000 pounds, requiring about 40 railroad cars. These shipments, naturally, greatly benefited railroads and railroad employees.

The sale of equipment for the Boulder power plant and other Government projects has materially aided the General Electric Co. in maintaining research and engineering laboratories which contribute important technical developments year after year and bring many benefits to the general public in the way of "more goods for more people at less cost." An outstanding contribution has been the development and production of equipment for more efficient utilization of natural power resources, thereby conserving these resources and, at the same time, contributing to lower electric rates.

The General Electric Co. maintains offices in all the principal cities, widely distributed warehouses and well-equipped shops, all of which are benefited either directly or indirectly by the large orders placed by the Bureau of Reclamation for Boulder power plant and others.

When the materials and labor involved in the construction of all reclamation projects are considered, the widespread results of the program can be appreciated.

Included in the work completed have been 147 dams for the storage and diversion of water; 20,000 miles of canals, ditches, and drains; and a multitude of small structures. Reservoirs created have a combined

³⁴ The General Electric Co. is only one of several which have supplied large quantities of electric equipment and machinery. Others include Westinghouse Electric & Manufacturing Co., Allis-Chalmers Manufacturing Co., Newport News Shipbuilding & Dry Dock Co., Hardie-Tynes Manufacturing Co., and Babcock & Wilcox Co.

³⁵ Letter from General Electric Co. to Mr. John C. Page, Commissioner, Bureau of Reclamation, February 9, 1939.

capacity of 45,522,970 acre-feet of water, a volume sufficient to cover the six New England States to a depth of more than 1 foot. In addition, 24 power plants on 13 projects have been built and the machinery and other equipment for the generation of electric energy have come almost entirely from States outside of the West.

Speaking at Grand Coulee, Wash., on October 2, 1937, President Franklin D. Roosevelt said that while Grand Coulee Dam was looked upon as something benefiting—

this part of the country primarily * * * But we must remember one-half of the total cost of this dam is paid to the factories east of the Mississippi River * * *. So in every correct sense it is a national undertaking and doing a national good.

CHAPTER VIII. RECLAMATION CROP PRODUCTION

Analyses of crop production records of Federal reclamation projects, as well as of all irrigated land in the West, demonstrate that farming in those areas carries no threat for the farmers of other sections of the country.

Of the crops of which the Nation has exportable surpluses—corn, wheat, and cotton—the acreage on Federal reclamation projects, which are, for the most part, typical of all irrigation developments in these areas, was less than one-fourth of 1 percent in 1937. No tobacco is grown on irrigated land.

In a bulletin on *The Facts on Irrigated Land*,³⁶ the Agricultural Adjustment Administration, Department of Agriculture, pointed out “how insignificant from a competitive standpoint, is the wheat, cotton, and corn production on these projects” by citing that in 1936 the wheat yield was only 4,374,435 bushels; cotton, 176,449 bales; and corn, 1,730,232 bushels. In that year, the project wheat crop represented less than seven-tenths of 1 percent of the national yield; cotton about 1½ percent; and corn less than one-tenth of 1 percent. While the cotton yield in 1937 showed increase over the previous year, the average acreages for 1935–37 in these three crops showed a decrease over the comparable period in the twenties.

Two types of crops dominate on irrigated land, and neither is competitive with those of other regions. First, from the standpoint of acreage, are the hay and forage crops, which provide half of the feed for the livestock industry of the West. From the standpoint of returns to the farmer, the specialty crops of sugar beets, vegetables, melons, and fruits come first, and none is competitive generally with similar products of other areas in the United States.

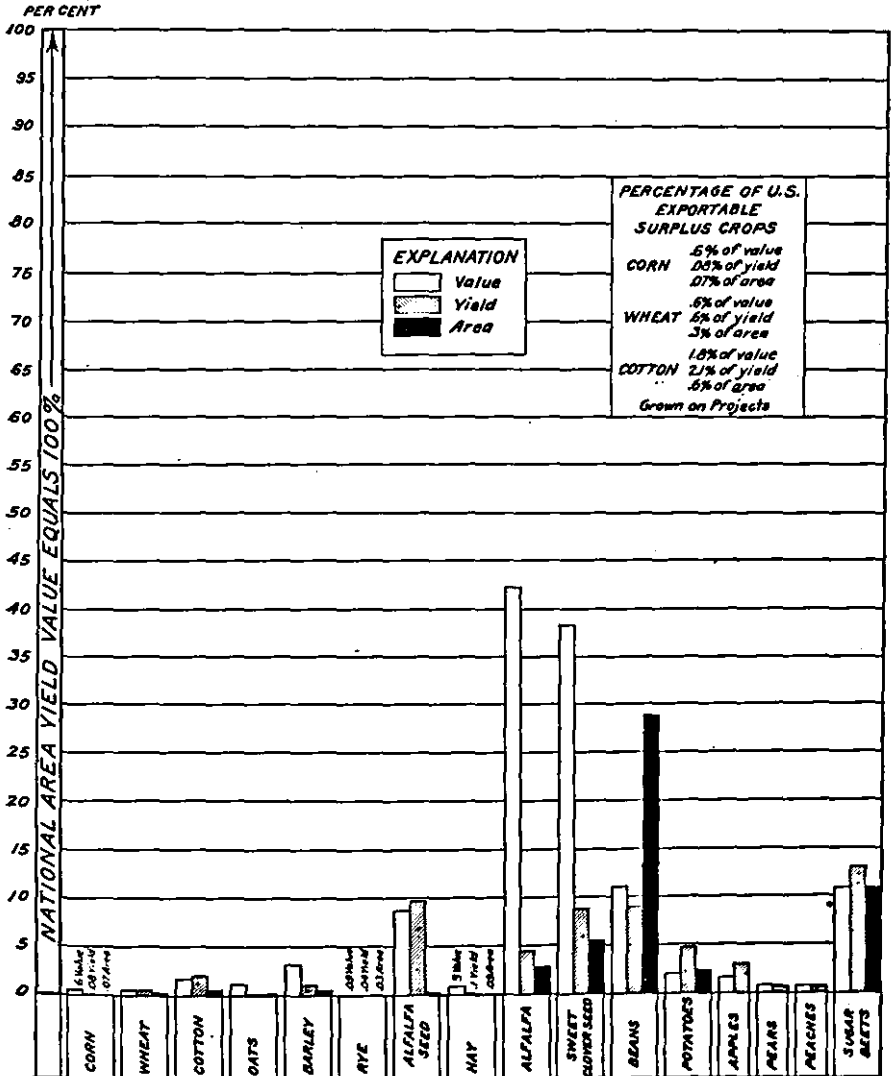
Great expanses of the western ranges could not be used for the grazing of sheep and cattle without the small irrigated areas to produce the hay for winter feeding.

Irrigated agriculture complements the farm operations of the humid regions through contributing to the western livestock industry, which provides feeders for the stock pens in the grain-producing humid region, and in other ways.

Sugar beets produced on irrigated land take no market from the farmers of the Midwest, East, or South, for the United States imports 3 pounds of sugar for each pound produced in this country.

³⁶ See Appendix 7, p. 55.

PRINCIPAL CROPS ON RECLAMATION PROJECTS COMPARED WITH NATIONAL AREAS, YIELDS AND VALUES OF SAME CROPS FOR 1937 - NATIONAL FIGURES EQUALING 100 PERCENT
(FIGURES FROM U. S. CENSUS, BUREAU OF RECLAMATION AND THE DEPT. OF AGRICULTURE)



CROPS PRODUCED ON FEDERAL RECLAMATION PROJECTS .

Principal crops on reclamation projects¹ compared with national values, yields, and areas of same crops for 1937, national figures equaling 100 percent

[Figures from U. S. Census, Bureau of Reclamation, and Department of Agriculture]

	Value in entire United States (total)	Value on Federal reclamation projects (total)	Percent of value from reclamation projects	Yields in entire United States (total)	Yields on Federal reclamation projects (total)	Percent of yields from reclamation projects	Acreage in entire United States (total)	Acreage on Federal reclamation projects (total)	Percent of acreage reclamation projects
Exportable surplus crops:¹									
Corn.....	\$234,385,000	\$1,308,225	0.6	¹ 2,644,995,000	2,140,533	0.08	93,810,000	68,246	0.07
Wheat.....	666,549,000	3,845,202	.6	¹ 873,993,000	4,918,118	.6	64,460,000	166,063	.3
Cotton.....	684,622,000	12,481,849	1.8	¹ 12,383,000	259,819	2.1	33,930,000	207,762	.6
Total.....	1,685,553,000	17,634,276	1.1				192,186,000	442,073	.23
Other principal crops:									
Barley.....	43,042,000	1,429,190	3.3	¹ 219,635,000	2,602,485	1.1	35,079,000	61,971	.2
Oats.....	61,522,000	774,380	1.2	¹ 1,146,258,000	2,299,538	.2	9,959,000	56,706	.6
Rye.....	14,604,000	14,492	.09	¹ 49,449,000	21,906	.04	3,839,000	1,151	.03
Alfalfa seed.....	12,159,000	1,091,180	8.9	¹ 944,000	93,358	9.9	493,300	14,918	.3
Hay.....	92,784,000	854,874	.9	¹ 83,087,000	99,501	.1	66,344,000	63,759	.09
Alfalfa.....	27,056,000	11,407,075	42.2	¹ 27,056,000	1,243,570	4.6	13,787,000	404,594	2.9
Sweetclover seed.....	3,089,000	1,180,404	38.5	¹ 954,100	86,651	9.0	285,900	16,148	5.6
Beans.....	15,781,000	1,781,310	11.2	¹ 12,690,000	1,157,046	9.1	167,970	49,333	29.0
Potatoes.....	198,180,000	4,144,747	2.1	¹ 391,159,000	19,385,085	4.9	3,176,900	77,673	2.4
Apples.....	109,534,000	1,778,136	1.6	¹ 211,060,000	6,685,210	3.1		23,606	
Pears.....	16,069,000	921,974	5.7	¹ 30,139,000	1,756,248	5.8		6,342	
Peaches.....	51,749,000	440,274	.8	¹ 59,620,000	368,540	.7		4,055	
Sugar beets.....	52,107,000	5,738,221	11.0	¹ 8,798,000	1,163,665	6.0	759,000	86,573	11.0
Citrus.....		1,403,908		¹ 34,750,000	2,082,592	13.2		23,365	
Total value.....	3,840,000,000	72,893,649	1.9	3,840,000,000	72,893,649	1.9	3,840,000,000	72,893,649	1.9
Total area (acres).....	340,876,000	1,700,969	.5	340,876,000	1,700,969	.5	340,876,000	1,700,969	.5

¹ Warren Act lands are not included.
² No tobacco is produced on irrigated land.
³ Bushels.
⁴ Bales.
⁵ Tons.
⁶ Boxes.

Winter vegetables serve to balance the diet of the great consuming centers to the eastward but obviously cannot be marketed there, when the produce of nearby farms is available. The distance of 1,000 to 3,000 miles from the irrigated land to the big cities of the Midwest and East serves as a virtual tariff barrier that precludes competition when the truck farmer nearby can fill the demand. The western produce moves east, for the most part, only when the western harvests come in months that are not producing periods in the sections having more rigorous climate.

What has been said of vegetables is true in large part of fruits grown on irrigated land. Citrus fruits of California and Arizona have world-wide reputations. Seasonal considerations control the marketing of practically every fruit shipped eastward. When local production is available to eastern markets, the irrigated crop is canned.

To summarize crop production on irrigated land and particularly with reference to Federal reclamation projects: Approximately half of the crops are fed to livestock in the immediate areas. The remainder is consumed in the West or shipped eastward to market when the produce of farms near the great consuming centers is not in season.

CHAPTER IX. ELECTRIC POWER AND RECLAMATION

Before Federal reclamation became a factor in the development of the West, water power was predominantly the source of electric energy in that section. Private capital pioneered in the development of hydroelectric plants and acquired many of the choice western water-power sites.

Of electric energy produced in the 11 States of the Mountain and Pacific groups in 1937,³⁷ 83 percent was generated by use of water power. Less than 7 percent, however, was produced at hydroelectric plants of the Bureau of Reclamation.³⁸ Fuels used in power generation in these 11 States are principally oil and gas. Only 2 percent of the coal used in the production of energy for public use in the United States is consumed in power plants in these States.

Development of water power, where feasible, in connection with irrigation has been recognized from the outset as a means of furthering the objectives of the national reclamation policy. The maximum conservation and utilization of the limited water resources of the West demand that, where feasible, advantage be taken of the power head created by storage dams. The use of stored water obtained by passing it through turbines en route to the land to be irrigated does not diminish its value for irrigation, but it greatly increases the over-all efficiency of the project.

Most of the power from the plants constructed by the Bureau of Reclamation, several of which are operated by water users' organizations, is sold to municipalities for distribution or to utilities or other public agencies. The remainder is used for pumping and other project purposes. At Boulder Dam, where water power is combined with irrigation, flood control, and navigation, both the generation and the transmission of the energy are in the hands of contractors. Revenues from power will repay the capital investment in power

³⁷ Electric Power Statistics, 1937, Federal Power Commission, May 1938.

³⁸ See appendix 3, p. 42.

facilities, and in several instances, such as the supplemental power facilities on the All-American Canal, will materially reduce charges to water users on irrigation features. While no interest is charged water users on irrigation features of these projects, the rates at which power is sold include interest on the capital investment in power facilities.

Production of electric energy for public use in the 11 Western States in 1937 was 17 percent of the national total. This area had only 10 percent of the Nation's population. In areas where Federal reclamation projects have been developed, there have been extraordinary gains in consumption.

Anticipating additional growth of population in the West and continued expansion of the market for low-cost power, the increased generating capacity provided for in the present long-range program of the Bureau of Reclamation will be required in the next 10 to 25 years.

The ultimate capacity of plants already constructed on projects and of power developments on projects still under construction will approximate 5,590,000 horsepower.

Power revenues are expected to repay more than half a billion dollars of the ultimate construction cost of the reclamation projects now completed or under construction, including Boulder Dam. This is nearly half of the estimated total cost of these projects.

CHAPTER X. FINANCIAL ASPECTS OF RECLAMATION

The late Dr. Elwood Mead, Commissioner, Bureau of Reclamation,³⁹ emphasized that "the effort is to make Reclamation a business activity in all that the name implies" and further that "its expressed purpose is to build irrigation works, not as a gift, but as an investment."

Repayment of construction costs into the reclamation revolving fund was a basic principle of the Reclamation Act of 1902. This principle has been maintained, although from time to time repayment periods have been lengthened to meet changing conditions.

Total repayments by water users, and from power and other revenues, approximate \$60,000,000 or about 30 percent of the outlay for projects now repaying, excluding Boulder Dam and the All-American Canal, which were constructed under special legislation.

Of construction water-right charges due to June 30, 1938, of \$51,200,059, exclusive of charges which became due and were later deferred, all but 2.2 percent or \$1,169,488 had been collected.⁴⁰

Of charges for operation and maintenance, totaling \$32,776,889, only \$179,224, or less than one-half of 1 percent, was not collected.⁴⁰

For the rental of irrigation water, the total amount due to June 30, 1938, was \$10,184,456 and less than 1.3 percent remained unpaid.⁴⁰

The problems of irrigation farmers are similar to those of the farmers of humid regions. Although irrigation farmers have greater security in producing crops, "irrigation agriculture with its high and inelastic overhead is more seriously affected by low prices than is rainfall agriculture."⁴¹

Consequently, the Congress, in years of economic stress, has responded to appeals for relief by extending the time for repayment

³⁹ From 1924 until his death in 1936.

⁴⁰ See appendix 9, p. 64.

⁴¹ Schmitt-Haw report to Secretary of the Interior, *op. cit.*, p. 88.

of construction charges or by authorizing such action when circumstances beyond the control of the settlers affected their ability to meet the annual charges. This relief has been in the form of a postponement of repayments and not in the form of cancelations.

CHARGE-OFFS OF CONSTRUCTION COSTS

Another chapter of reclamation finances relates to the abandonment of several small projects on which construction was begun in the early days and to charge-offs⁴² of construction costs, as authorized by the Congress.

The original law provided that funds accruing to the reclamation fund from the sale of public lands should be expended in the States wherein these lands were sold, but this provision was soon repealed because too great a restraint was placed on the selection of sound projects by the administrator of the law. Owing largely to this provision certain small projects were constructed which later had to be written off. These projects, although no longer required to make repayments to the United States, for the most part have continued operation.

In the pioneering state of Federal reclamation, errors were made in estimating water supplies that could be made available and the acreages that could be brought into production. This was due largely to inexperience and lack of adequate stream measurements. In what is known as the Adjustment Act of 1926, and in other enactments, charge-offs of costs of abandoned projects and of construction outlays incident to these mistakes were directed.⁴³ Also, construction charges against land found to be temporarily unproductive were suspended.

The total of \$17,117,514 thus was written off the books. This represented a little more than 10 percent of the construction costs of all Federal reclamation projects at the time of the passage of the Adjustment Act in 1926. It represented less than 7 percent of the construction costs of projects in operation in 1938. A substantial part of the area on which charges were suspended has become productive and payment of charges has been resumed.

FAVORABLE RECORD OF REPAYMENTS

The Repayment Commission in reporting to the Congress, through the Secretary of the Interior under date of May 18, 1938,⁴⁴ observed:

Despite the moratoria periods of 1921-24 and 1931-36, suspending repayments, and many unfavorable factors affecting repayment under a program involving trail-blazing activities of a varied character, the record of repayment of original construction costs compares favorably with those of far less expensive non-Federal irrigation enterprises which have been refinanced from time to time in the last 30 years.

Under the present system of determining the economic feasibility of proposed projects under the Reclamation Law, nothing is left to chance. The procedure of investigation is thorough in detail and covers every factor that may have a bearing on the ability of land to repay construction costs in 40 years.

⁴² See appendix 1, p. 40.

⁴³ See appendix 9, p. 64.

⁴⁴ House Document 673, *op. cit.*, p. 11.



UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 WESTERN PART OF THE UNITED STATES
 SHOWING LOCATION OF
 IRRIGATION PROJECTS OF THE
 BUREAU OF RECLAMATION
 Scale of Miles
 0 50 100 150
 Map No. 20-5
 January 1929

DESIGNED BY U. S. ARMY ENGINEERS

Surveys are made of sources of water supply, of costs involved in alternative plans, of soil conditions, of what the land will produce, of the prospective markets for crops, and of the length of time anticipated for settlement.

Upon the results of these investigations are based the recommendations of the Bureau of Reclamation and the Secretary of the Interior as to the construction of a project.

The Adjustment Act of 1926 has been interpreted as making repayment in 40 years under normal conditions the test of the feasibility of a project. This test is strictly adhered to in connection with investigations of proposed projects.

Adequate funds for thorough investigations of proposed projects have been insisted upon by the Bureau of Reclamation as essential to initiating and developing reclamation projects on a sound basis. With the experiences of the pioneering days, the importance of investigations has been emphasized. The construction of a successful project not only insures return of the costs, but is a definite and continuing contribution to the economic and social development of the country.

CHAPTER XI. INDIAN IRRIGATION PROJECTS

In the 11 States of the Mountain and Pacific groups are nearly 50,000,000 acres in Indian reservations with additional areas west of the one hundredth meridian in other States. Before Federal reclamation became an established policy of the United States, efforts were made to bring water to the arid lands in the Indian areas.

Later as interest in irrigation grew, irrigation on Indian reservations became an important function of the Office of Indian Affairs. Its present program will provide eventually for the irrigation of 1,200,000 acres⁴⁵ at a cost of approximately \$100,000,000.⁴⁶ Of this amount, more than \$50,000,000⁴⁷ already has been expended in the construction of canals to supply water for irrigating about 800,000 acres. Approximately 525,175 acres were actually irrigated in 1937. This was an increase of nearly 50,000 acres over the previous year. Of the watered area 168,360 acres were irrigated by the Indians; 134,689 acres were owned by Indians and leased to others; and 220,126 acres were owned by other races. More than 10,000 Indian families were making their living by irrigation farming, an increase of 1,600 over the number so engaged during the previous year.

Most of the Indian irrigation activities are located in the States of Arizona, Montana, New Mexico, Nevada, Utah, Idaho, Washington, and Wyoming.⁴⁸

CHAPTER XII. EXTENT OF IRRIGATION—PRESENT AND FUTURE

Irrigation systems, Federal and non-Federal, have been constructed to supply an irrigable area in excess of 25,000,000 acres,⁴⁹ but the maximum actually irrigated has never exceeded 20,000,000 acres. This is less than 6 percent of the Nation's total cropped acreage in 1937. Not more than 3,700,000 acres have been provided with water,

⁴⁵ See appendix 5, p. 46.

⁴⁶ Annual Report of the Secretary of the Interior, 1938.

⁴⁷ See appendix 4, p. 42.

⁴⁸ See appendix 2, p. 41.

⁴⁹ See appendix 5, p. 46.

in whole or in part, by Federal works, including Indian project areas. Estimates of the possible area that may be brought under water in the 17 Western States vary from 10,000,000 to 26,500,000 acres.

These comparatively small acreages of irrigated and irrigable lands are important. The irrigated agriculture of the West is and must remain, because of climatic conditions, fundamental to the growth and development of that section.

The West has about as much arable land in proportion to its total area as any region. Land suitable for tillage, therefore, does not limit irrigation development. On the other hand, water is the limiting factor, because this region is arid or semiarid. By irrigation works the natural deficiency in rainfall can be and is made up in certain selected areas. If every drop of water available in all the streams of the region could be conserved and used for irrigation, however, the supply would be sufficient, apparently, to make productive through general farming only about one-fourteenth of the arid and semiarid section.

The report of the Land Planning Committee to the National Resources Board in 1934 estimated that the irrigable area in the arid and semiarid West at 51,534,900 acres, or slightly more than twice the area for which irrigation enterprises were prepared to supply water in 1930.⁴⁰

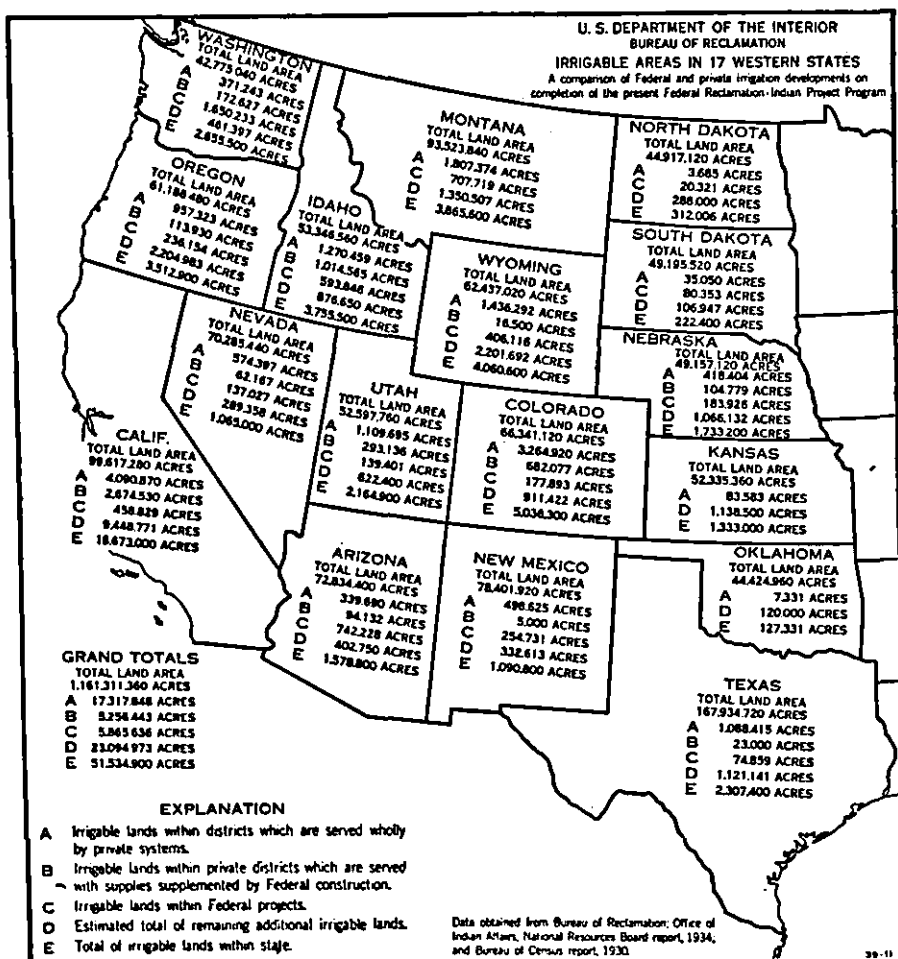
Bureau of Reclamation engineers, however, have estimated that the maximum additional area which can be irrigated by projects which might be considered feasible under present standards is 10,000,000 acres or 7,500,000 more than is contemplated by the present construction program.

As now projected, the current construction program of the Bureau of Reclamation contemplates bringing under irrigation about 2,500,000 acres of new land over a period of 20 years or more. Indian irrigation plans will add less than 500,000 acres. As no construction contemplating extensive new developments by agencies other than those of the Federal Government is now foreseeable, material expansion of irrigation beyond the present programs of the Federal Government is not to be expected, except as the Government itself may institute new projects.

When projects now under construction have been completed, a total of 28,439,927 acres of land will be provided with irrigation facilities by Federal and private agencies. A total of 17,317,848 acres will be dependent wholly on private systems, 5,256,443 acres will receive supplemental water from Federal works, and 5,865,636 acres will be within Federal reclamation and Indian irrigation projects.

Approximately 23,000,000 acres of undeveloped, irrigable land will remain, according to the estimates of the Land Planning Committee. Development of the remaining irrigable area, provided the standards of the Bureau of Reclamation are applied, will be limited by the economic feasibility of proposed projects, based on construction costs and the ability of the land to make repayment within 40 years.

⁴⁰ Land Available for Agriculture Through Reclamation, pt. IV, 1935.



CHAPTER XIII. FEDERAL RECLAMATION AND READJUSTMENTS IN LAND USES

Critical situations had been created in various areas within the United States through impoverishment of farm lands by soil erosion before the great drought was visited upon the Great Plains in the years following 1930, focusing attention on land-use problems generally.

The Department of Agriculture estimated that 86,000,000 acres of land in farms in the United States were "submarginal or unsuited to crop production and might reasonably be shifted to other more appropriate uses." Approximately 500,000 families, it was estimated, would be affected by a Nation-wide land-retirement program.⁶¹

Previously, in 1935, the Land Planning Committee in a report to the National Resources Board had estimated that 40,464,300 acres of land in the 17 States of the arid and semiarid regions should be retired. Of this total 10,607,900 acres were classified as crop-land with 58,000 farms involved.⁶²

⁶¹ Letter of Mar. 8, 1938, from Under Secretary M. L. Wilson to United States Senator Carl Hayden Senate hearings on H. R. 9621, 75th Cong., pp. 637-639.

⁶² Maladjustment in Land Use in the United States, pt. VI, Report to National Resources Board, 1936.

In pursuance of its program to remove from cultivation submarginal lands, the Department of Agriculture in 1938 had purchased or contracted to purchase in the Great Plains States alone a total of more than 5,149,000 acres. In all the States the Department had purchased or had under contract to purchase 8,732,000 acres, and the National Park Service, of the Department of the Interior, was completing negotiations for the acquisition of 395,000 additional acres.⁶³

In its study of conditions in the drought area, the Great Plains Committee⁶⁴ said that 31,000,000 acres in that area should be purchased to achieve optimum land-use readjustment, permitting 24,000,000 acres to be retired from crop farming and 7,000,000 acres to be used in enlarging existing farms.

The Nation is engaged in an earnest attempt to remove from cultivation a part of its submarginal lands; thus to free from a peonage wrought by Nature and misuse of the soil, a section of the population that has been endeavoring unsuccessfully to eke out an existence under adverse conditions.

RECLAMATION PROJECTS AND THE DROUGHT

In a letter to the Spokane (Wash.) Chamber of Commerce, August 29, 1936, President Franklin D. Roosevelt, wrote:

The tragic drought of 1936 has reemphasized the importance to the welfare of the Nation of conserving the waters of our western streams for use in stabilizing agriculture and strengthening the economic structure of the arid and semiarid regions.

Federal reclamation projects served to mitigate the effects of the drought of 1934 and are this year in many localities giving another demonstration of the wisdom and usefulness of our national reclamation policy.

Demonstrations of the sound planning and efficiency of Federal reclamation projects were given during the drought years of the present decade, when water supplies were put to more severe tests than had ever been anticipated. With few exceptions, the projects were able to provide ample water for the lands available for irrigation, and no Federal irrigation system was inoperative.

A comparison of the Bureau of the Census reports for 1929 and for 1934 on all irrigated agricultural land cropped in the West with the cropped areas of Federal reclamation projects for the same years is informative. Exclusive of pasture lands, the total irrigated area cropped in 1934 was 11,159,320 acres as compared with 14,080,000 in 1929, a decrease of 24 percent, due primarily to the adverse effect of the drought on water supplies where adequate storage facilities had not been provided. On projects of the Bureau of Reclamation, however, the decrease in the acreage cropped from 1929 to 1934 was only 1 percent. While no census on all pasture lands irrigated in 1934 is available, the area on Federal Reclamation projects devoted to pastures in that year increased 41 percent over 1929.⁶⁵ This provision of forage and pasture for livestock during the drought by projects of the Bureau of Reclamation was an important contribution to the stability of the West.

⁶³ Letter from M. L. Wilson, *op. cit.*

⁶⁴ The Future of the Great Plains, report of the Great Plains Committee, December 1936, pp. 73 and 75.

⁶⁵ H. Doc. 673, 75th Cong., 3d sess., p. 9.

During the drought years of 1934 and 1936, Federal Reclamation projects provided feed for the cattle and sheep of hard-pressed stockmen. One outstanding example may be cited. On the Pathfinder district, North Platte project, Nebraska, in 1936 there were fattened 25,000 cattle and 400,000 sheep from the ranges of Nebraska, Wyoming, and Montana. Other projects likewise furnished a market for feeder stock and provided surplus winter feed for cattle on the ranges.

RELIEF IN PROJECT AREAS

A survey made by the Repayment Commission of 1937-38⁵⁶ of relief demands on Federal Reclamation projects revealed that bona fide farm operators in only a few instances were forced on relief and that these confined to new settlers who had not had opportunities to bring their lands into production or who were subjected to conditions beyond their control. One project official estimated that the relief demands in dry-land territory were three times those of the irrigated areas of his State.

THE DEMAND FOR IRRIGATED LAND

The demand for irrigated land is increasing for two reasons: (1) Younger members of families on irrigated land in the West are seeking to make farm homes for themselves. (2) Great numbers of farm families, more than 50,000 of them from the Great Plains area alone, driven from their homes by drought and other causes, have migrated westward seeking land adequately watered where they may have an opportunity to make a new start in life and to become self-supporting.

When 69 farm units were offered for homestead on the Tule Lake Division of the Klamath project (Oregon-California) in September 1937, the Bureau of Reclamation received more than 3,300 informal inquiries concerning them, and 1,280 formal applications were filed for consideration.⁵⁷

The situation with respect to the farm families migrating to the West in search of new homes constitutes a national problem. It is not merely a problem of the West.

While reclamation projects under construction will eventually make available 2,500,000 acres of farm land newly wrested from the desert, even that acreage would not be sufficient to provide a 80-acre tract for more than a portion of the farm families already in the West from the Great Plains area alone.

MIGRATIONS FROM THE DROUGHT AREAS

From 1934 to the end of 1937, the Department of Agriculture estimated⁵⁸ that 58,400 farm families from the drought areas moved into seven far western States of Idaho, Oregon, Washington, California, Utah, Nevada, and Arizona. Of this number, fewer than 3,000 farm families had been settled. The remainder depended on seasonal agriculture and other employment, or relied largely on relief. These conditions and the continuance of migrations from the drought and other areas are reflected in the relief demands of the western States. It was predicted also that at least 20,000 additional farm families

⁵⁶ H. Doc. 673, 75th Cong., 3d sess. p. 3.

⁵⁷ Annual Report of the Secretary of the Interior, 1938, p. 51.

⁵⁸ Letter from M. L. Wilson *op. cit.*

would leave the Great Plains States and move into the West, totaling 75,400 families for whom provision must be made.

The Farm Security Administration estimated⁵⁹ that during the period 1934-37, the number of families migrating because of drought conditions into seven Western States was apportioned as follows:

Idaho, 11,500; Washington, 12,500; Oregon, 12,000; Utah, 200; Nevada, 100; Arizona, 500; California, 21,600.

Under favorable farming conditions and with adequate assistance, all of the drought immigrants could become self-supporting.

It is conservatively estimated that a quarter of a million people, or more than the number on the irrigated farms of reclamation projects now operating, are seeking homes in seven States of the arid and semiarid regions, and the migrations are continuing.

In California migrants also are recorded in great numbers from areas where sharecroppers are being displaced, not by drought, but by mechanization of farms. Exhaustion of soils caused many others to join the homeless bands.

A NATIONAL PROBLEM

There is no accurate count of the total who have been dislodged by all these conditions, but the migrants constitute a problem of grave and national proportions, especially in the West, since the movement in that direction is most pronounced, and particularly in California. Irrigation developments will assist in solving the problem through provision of new opportunities for many.

Commissioner Page said,⁶⁰ with reference to this problem:

Thoughtful men and women from coast to coast must consider the consequences. What are these people doing, now that they have "gone West"? Many of them are eking out an existence following the fruit and vegetable harvests around the calendar as they progress from the Imperial Valley northward. They live in camps, or at the side of the road, without sanitary facilities, without proper foods, and with dwindling hope. Many, when they have been in their newly adopted States long enough, apply for relief. Some obtain possession of land and resume farming, although the number doing this is pitifully small. So few have salvaged sufficient funds from the wreckage of their previous lives to be able to finance a new start on a farm. So very few farms are available out here where, in general, land must be irrigated to be productive; where the total farming area is so severely limited by an arid climate.

A solution to the problem thus presented to the United States must be found. A great nation cannot permit the degradation of its people. The western States and the western communities cannot tolerate long the threat created by tumbleweed towns to their health, their educational systems, their standard of living, and their peace and security.

The solution must be found eventually both in the correction of conditions which are cutting men loose from their land in other areas, and in the provision of opportunities for those who are already adrift to make new homes, to maintain their self-respect, and to weave anew their ties with wholesome communities. The choice, in the long run, must be between homes and havoc. * * * There seems no hope of increasing materially the opportunities to make farm homes in all this arid and semiarid western third of the United States, except through the construction of irrigation works.

⁵⁹ Letter from Will W. Alexander to Representative James G. Scrugham, of Nevada, hearings before the subcommittee of the Committee on Appropriations of the House of Representatives on the Interior Department appropriation bill for 1939, p. 250.

⁶⁰ In an address, Homes or Havoc, delivered October 12, 1938, before the National Reclamation Association in Reno, Nev.

APPENDIXES

APPENDIX 1

FEDERAL RECLAMATION PROJECTS

In operation (1937-38):

Arizona: Salt River.
Arizona-California: Yuma.
Arizona-Nevada: Boulder Dam.
California: Orland.
Colorado: Grand Valley, Uncompahgre.
Idaho: Boise, Minidoka.
Montana: Bitter Root, Frenchtown, Huntley, Milk River, Sun River.
Montana-North Dakota: Lower Yellowstone.
Nebraska-Wyoming: North Platte.
Nevada: Newlands.
New Mexico: Carlsbad.
New Mexico-Texas: Rio Grande.
Oregon: Baker, Stanfield and Westland, Umatilla, Vale.
Oregon-California: Klamath.
Oregon-Idaho: Owyhee.
South Dakota: Belle Fourche.
Utah: Weber River (Salt Lake Basin), Hyrum, Ogden River, Sanpete, Strawberry Valley.
Washington: Okanogan, Yakima.
Wyoming: Riverton, Shoshone.

Area on projects:

Total irrigable for which Bureau was prepared to supply water in 1937, 2,194,830 acres.

Total area irrigated, 1937, 1,725,463 acres.

Total area cultivated, 1937, 1,700,969 acres.

Area under Warren Act or other supplemental water service contracts:

Total irrigable for which Bureau was prepared to supply water, 1,571,382 acres.

Total irrigated, 1,389,338 acres.

Total cultivated, 1,333,800 acres.

Grand totals (1937):

Areas for which Bureau was prepared to supply water, 3,766,212 acres.

Areas irrigated, 3,114,801 acres.

Areas cultivated, 3,034,769 acres.

Projects or units of projects under construction (1937-38):

Arizona: Gila.

California: All-American Canal, Central Valley.

Colorado: Colorado-Big Thompson, Fruitgrowers' Reservoir,¹ Pine River.

Idaho: Boise-Payette division.

Idaho-Wyoming: Upper Snake River storage.

Montana: Buffalo Rapids.

Nevada: Humboldt,¹ Truckee storage.

New Mexico: Tucumcari.

New Mexico-Texas: Rio Grande (Elephant Butte power development).

Oregon: Burnt River,¹ Deschutes.

Utah: Moon Lake,¹ Provo River.

Washington: Grand Coulee (Columbia Basin), Yakima-Roza division.

Wyoming: Kendrick, Shoshone-Heart Mountain division.

Additional irrigable area on projects: 2,485,720 acres.

¹ Now completed.

Additional irrigable area to be supplied supplemental water: 3,680,788 acres.

Total areas for which water will be available:

On projects, 4,678,914 acres.

Supplemental water, 5,256,443 acres.

Projects charged off:

Idaho: King Hill.

Kansas: Garden City.

New Mexico: Hondo.

North Dakota: Buford-Trenton, Williston.

APPENDIX 2

PRINCIPAL PROJECTS IN INDIAN IRRIGATION PROGRAM

[Individual projects less than 500 acres omitted]

Arizona.—Ak Chin, Camp McDowell, Chiu Chui, Colorado River, Fort Apache, Navajo (31 small projects), Papago villages, Salt River, San Carlos (project), San Carlos (Reservation), San Xavier.

California.—Northern and central (18 small projects); southern (25 small projects).

Colorado.—Pine River.

Idaho.—Fort Hall (project); Fort Hall (miscellaneous).

Montana.—Blackfeet, Flathead (project), Fort Belknap, Fort Peck, Tongue River.

Nebraska.—Miscellaneous garden tracts.

Nevada.—Fallon (Carson Sinks), Fort McDermitt, Moapa, Pyramid Lake, Walker River, Western Shoshone.

New Mexico.—Jicarilla, Mescalero, Navajo (19 small projects), United Pueblos (23 small projects).

North Dakota.—Stock water and garden tracts.

Oregon.—Klamath (five small projects), Warm Springs, Umatilla.

South Dakota.—Domestic and stock water.

Utah.—Goshute, Navajo (Aneth), Navajo (Montezuma Creek), Uintah, Uncompahgre.

Washington.—Ahtanum, Toppenish-Simcoe, Wapato, Colville, Klickitat,² Lumpi diking project, Spokane, West Okanogan.

Wyoming.—Wind River.

Total area of Indian projects irrigated (1937), 523,175 acres.

Total area of Indian projects under constructed canals (1937), 800,000 acres.

Total estimated irrigable area in Indian projects, 1,199,023 acres.

² Estimated cost of Klickitat project not included in ultimate investment for Indian irrigation program (chart II) as no comparable acreage is outlined. Construction depends on power market.

APPENDIX 3

POWER PLANTS ON RECLAMATION PROJECTS

Ultimate power installation on Federal reclamation projects

Project	Ultimate installation in kilovolt-amperes	Ultimate installation in horsepower
Boulder Canyon.....	1,317,500	1,835,000
Grand Coulee.....	1,944,000	2,700,000
Central Valley.....	375,000	515,000
Kendrick.....	37,500	45,000
Rio Grande (Elephant Butte).....	27,000	34,500
Shoshone.....	7,000	8,200
Riverton.....	2,000	2,400
Newlands.....	1,875	2,490
Grand Valley.....	3,750	5,000
Minidoka.....	15,540	(1)
Parker Dam ¹	120,000	(2)
Yuma.....	2,000	2,700
All-American Canal ³	54,200	72,600
Strawberry Valley.....	2,000	3,500
Colorado-Big Thompson.....	142,500	191,500
Salt River.....	83,210	94,500
Boise (including Twin Springs).....	41,875	55,810
Yakima.....	15,187	16,000
North Platte.....	7,750	9,300
Uncompahgre.....	2,000	2,280
Provo River ⁴		
Owyhee ⁵		
Total.....	4,201,887	5,593,280

¹ One unit not yet designed.² Constructed by Bureau of Reclamation for Metropolitan Water District of Southern California, which financed the dam. Half the power will belong to the United States.³ Equipment not designed.⁴ Power installations on the All-American Canal are being made by the Imperial Irrigation District.⁵ The 16,000 horsepower includes Reza division only.⁶ At Deer Creek Dam penstocks are being installed for possible future development of 2 units.⁷ At Owyhee Dam 2 penstocks, 72 inches in diameter, were installed for possible future installation of 2 units.

APPENDIX 4

INVESTMENTS IN IRRIGATION ENTERPRISES

The construction costs of Federal and Indian projects will represent approximately 60 percent of the total investment in all public and private irrigation and related works in 15 Western States upon completion of the current construction programs of the Bureau of Reclamation and Office of Indian Affairs.

Since no large expenditures for irrigation other than those by Federal agencies are now foreseeable, Bureau of the Census reports as to investments of non-Federal funds as of 1930 are used where applicable in calculations.

As of 1930, the Bureau of the Census reported that the aggregate investment in irrigation facilities was \$1,032,755,790, of which \$225,566,496 represented the outlay of the Bureau of Reclamation and the Office of Indian Affairs. The remainder was made up principally of expenditures by individuals, partnerships, cooperatives, irrigation districts, and commercial enterprises. Less than \$17,000,000 of State and municipal funds had been expended at that time on irrigation systems.

By 1938, counting funds available for construction work on July 1, it was estimated that the Federal investment in projects completed or with units operating was in excess of \$440,000,000, including Boulder Dam.

Chart I compares the Federal investment in 1938 by States in projects either completed or with one or more units in operation with the investments of others, as reported by the Bureau of the Census

APPENDIX 3—Continued

Power plants operated on reclamation projects during fiscal year 1937-38

Project	Name of plant	Outgoing line voltage	Plant capacity (kilovolt-amperes)	Number of units	Head in feet	First cost of plant (all features)	Cost of operation and maintenance without depreciation (all features)	Estimated depreciation	Cost per kilowatt-hour, exclusive of depreciation	Distribution of kilowatt-hours generated				Total output (kilowatt-hours)	Gross power sales	
										Sold to consumers (kilowatt-hours)	Irrigation and drainage requirements (kilowatt-hours)	Used for other purposes (kilowatt-hours)	Losses (kilowatt-hours)			
Boise	Black Canyon	66,000	10,000	2	75.4 to 96.7	\$414,317.21	\$11,138.98	None	0.00022	1,264,911,262 (9)	23,067,662 (4)	1,438,700 (9)	1,164,687 (4)	1,604,942,369 (1)	(1)	
	Boise River	22,000	1,875	3	24.9	167,995.37	5,439.98	None	0.0023							
Boulder Canyon	Boulder	69,000	458,500	8	522	26,563,314.61	(6)	(9)	(9)	1,427,928,442		13,929,458	10,427,103	1,462,282,000	\$1,888,132.84	
		138,000														287,500
Grand Valley	Grand Valley	2,300	3,750	2	73 to 79	210,500.00	(7)	(9)	(7)	(7)	(7)	(7)	(7)	7,226,920	(1)	
Minidoka	Minidoka	33,000	10,000	6	47.65 average	1,110,195.86	137,192.14	\$38,002.00	.002	21,812,128	34,539,966	7,904,681	3,857,664	9,081,114,406	200,432.16	
	American Falls ¹⁰	33,000	540	1	44											78,975.00
Newlands	Lahontan	2,300	1,875	3	110 to 120	324,793.52	19,766.38	7,619.84	.00046	3,067,458	101,302	64,430	340,000	3,592,270	36,735.80	
		33,000														
North Platte	Guernsey	33,000	6,000	2	70 to 90	454,244.27	14,578.38	None	.000871	23,618,769 (13)	15,439 (13)	320,347 (13)	1,899,184 (13)	11,261,273,770 (11)	271,398.97 (11)	
	Lingle	33,000	1,750	4	106	184,791.74	12,938.98	None	.001424							
Rio Grande	Elephant Butte	33,000	1,750	2	18 to 180	8,440.50	2,175.94	None	.0054	None	None	400,610 (16)	None	400,610 (16)	None	
		2,300	150	1												
Riverton	Pilot Butte	33,000	2,000	2	100 average	262,899.00	12,611.72	None	.006742	1,218,765	None	549,634	102,150	1,870,549	26,196.21	
Salt River ¹¹	Roosevelt	110,000	19,250	7	70 to 240	1,372,193.75	16,241.21	68,609.69	.001388					87,351,000		
	Arizona Falls	110,000	1,060	2	19	115,566.47	8,464.46	5,778.32	.002249					3,764,269		
	Chandler	11,000	600	1	40	177,410.37	8,680.11	8,870.52	.002123					4,094,180		
	Cross Cut	11,000	5,250	6	111	663,928.33	25,766.26	23,196.02	.001688					18,297,000		
	Horse Mesa	40,000		3	265	982,756.47	63,798.87	49,137.82	.000542					117,790,000		
	Mormon Flats	110,000	8,750	1	40 to 150	472,011.68	18,367.53	23,600.58	.000964					23,146,000		
	Stewart Mountain	45,000	13,000	1	35 to 114	344,070.32	13,039.57	17,203.52	.000332					29,310,000		
	South Consolidated	40,000	2,000	2	34	176,202.81	8,918.56	8,810.14	.000785					11,263,000		
	Total										17,397,896,897	11,341,106,259	11,393,184	11,641,027,276	11,496,413,616	11,374,226.94
	Shoshone	Shoshone	33,000	7,000	3	220	883,037.48	16,374.33	None	.00214	10,051,779	None	27,956	1,291,996	11,391,690	100,052.65
Strawberry Valley	Strawberry Valley	11,000	1,312	3	126.5 to 48.5	175,900.00	11,800.00	None	.002157	5,574,636	None	59,786	164,461	11,528,296	87,694.12	
Yakima:	Prosper	66,000	3,000	1	40	404,843.88	8,262.23	None	.00034	24,076,296		43,184	361,240	24,000,570		
		Sunnyside	6,600	187	1	73	23,000.00	1,546.71	1,056.40							.0023
Yuma	Siphon Drop	33,000	2,000	2	14.29 maximum 9.82 average	317,396.00	25,012.32	7,950.00	.003727	5,423,484	1,296,464	82,994	420,607	11,711,996	44,056.63	

¹ To Idaho Power Co., T. E. Connolly, Inc., Lackey gravel plant, and Civilian Conservation Corps Camp BR-26.

² Includes Boise River power plant. 1,216,952 kilowatt-hours purchased from the Idaho Power Co.

³ Not reported.

⁴ Included with Black Canyon power plant.

⁵ 5 units at 82,500 kilovolt-amperes; 1 unit at 40,000 kilovolt-amperes; and 2 units at 3,000 kilovolt-amperes installed and operating as of June 30, 1938.

⁶ Not available.

⁷ Operated by contractor.

⁸ None—constructed with advanced funds.

⁹ Includes 14,169,406 kilowatt-hours from Idaho Power Co.

¹⁰ Has not been operated since 1927.

¹¹ Estimated.

¹² Total of both plants: Guernsey, 9,085,070 kilowatt-hours; Lingle, 16,738,700 kilowatt-hours.

¹³ Included with Guernsey power-plant data.

¹⁴ Unknown.

¹⁵ Reports are for calendar year of 1937.

¹⁶ Total for system. Includes 194,341,636 kilowatt-hours of purchased power.

¹⁷ Total for system.

¹⁸ Includes cost of Garland substation, amounting to \$4,292.72.

¹⁹ Costs for the month of June 1938 are estimated; books for that month were not closed at the time of preparing this statement.

²⁰ Includes 2,627,300 kilowatt-hours of dump energy.

²¹ Exclusive of 550,600 kilowatt-hours purchased.

²² Includes 4,500,000 kilowatt-hours of winter power delivered to Pacific Power & Light Co. in payment for transmission of power to irrigation districts.

²³ Includes 673,600 kilowatt-hours purchased.

NOTE.—Reprinted from The Reclamation Era, December 1938.

for 1930 in irrigation systems. The amounts by States are given in the accompanying table.

The Federal outlay for irrigation and related works, it is estimated, will exceed one and a quarter billion dollars on completion of present programs.

Of this total, the expenditures on Federal reclamation projects and Boulder Dam will approximate \$1,169,000,000,² while Indian irrigation projects in the 15 States will account for \$87,329,000, exclusive of the estimated outlay of \$10,000,000 for the proposed Klickitat project in Washington. The maximum Indian outlay is placed at \$100,000,000.³

PRESENT PRIVATE AND FEDERAL INVESTMENT IN
IRRIGATION - RECLAMATION ENTERPRISES IN WESTERN STATES (1930)
(FIGURES FROM U. S. CENSUS, BUREAU OF RECLAMATION AND OFFICE OF INDIAN AFFAIRS)

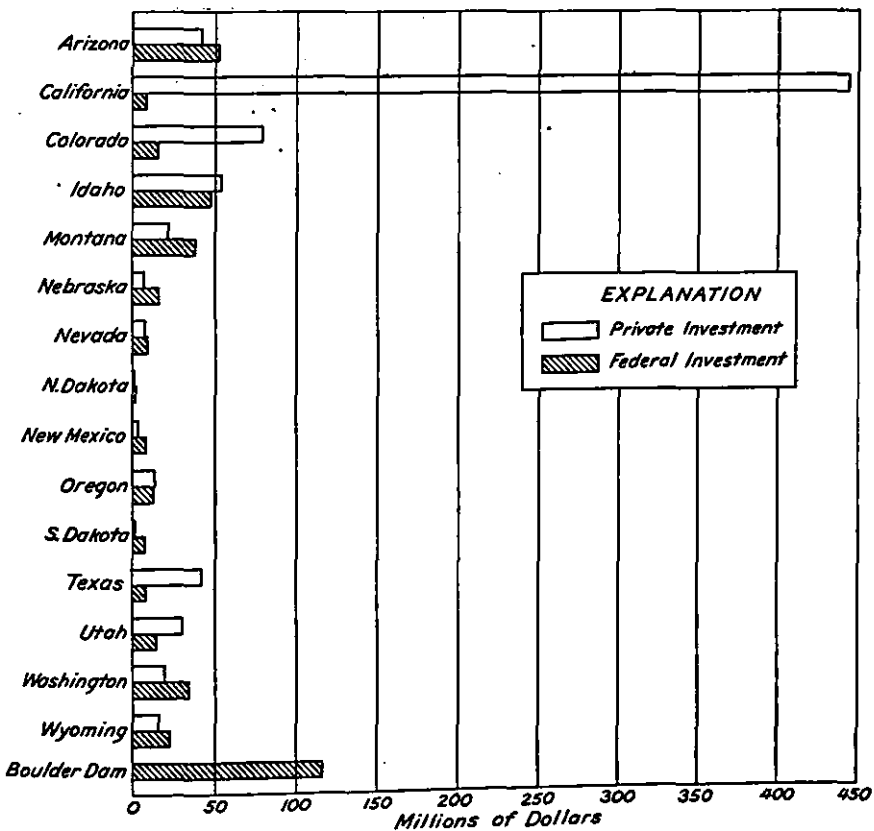


CHART I

Chart II presents by States a comparison of the ultimate estimated investment in reclamation and Indian irrigation works and that of private enterprises as reported by the Bureau of the Census in 1930. Amounts by States are given in the accompanying table.

Most of the construction by agencies other than those of the Federal Government involved low-cost systems, for few of which storage facilities were required.

¹ Summarized Data, Federal Reclamation Projects, Bureau of Reclamation, Jan. 15, 1930.
² Annual Report of the Secretary of the Interior, 1938, p. 223.

Present private¹ and Federal² investment in irrigation-reclamation enterprises in Western States (1938)

[Figures from U. S. Census, Bureau of Reclamation, and Office of Indian Affairs]

State and source of investment:

Arizona:		
All private.....		\$42, 907, 941
All Federal.....		52, 515, 181
California:		
All private.....		444, 799, 640
All Federal.....		8, 188, 783
Colorado:		
All private.....		75, 826, 908
All Federal.....		15, 528, 628
Idaho:		
All private.....		53, 150, 418
All Federal.....		48, 316, 529
Montana:		
All private.....		22, 403, 601
All Federal.....		39, 617, 305
Nebraska:		
All private.....		7, 782, 751
All Federal.....		16, 304, 734
Nevada:		
All private.....		7, 329, 858
All Federal.....		9, 486, 542
North Dakota:		
All private.....		55, 091
All Federal.....		2, 281, 723
New Mexico:		
All private.....		7, 917, 963
All Federal.....		18, 689, 503
Oregon:		
All private.....		27, 346, 251
All Federal.....		26, 623, 871
South Dakota:		
All private.....		434, 377
All Federal.....		5, 539, 613
Texas:		
All private.....		42, 783, 919
All Federal.....		8, 378, 093
Utah:		
All private.....		30, 487, 839
All Federal.....		14, 314, 264
Washington:		
All private.....		19, 526, 454
All Federal.....		34, 586, 737
Wyoming:		
All private.....		16, 093, 560
All Federal.....		23, 407, 603
Boulder Dam ³		117, 310, 000
Total:		
All private.....	\$798, 846, 571	
All Federal:		
Reclamation		
projects.....	\$264, 392, 761	
Boulder Dam ³	117, 310, 000	
Indian projects....	58, 386, 348	
Total Federal ⁴	\$440, 089, 109	
Grand total.....		\$1, 238, 935, 680

¹ Private investment reported by census, 1930; change since has been negligible.

² Includes cost of power facilities in projects operating in 1938 and funds available July 1, 1938.

³ Boulder Dam constructed under special act of Congress by Bureau of Reclamation and is not credited to any particular State as it affects 7 States of Colorado River Basin.

⁴ Includes construction costs written off under Adjustment Act of 1926.

PRIVATE INVESTMENT IN IRRIGATION - RECLAMATION
ENTERPRISES AND ULTIMATE FEDERAL INVESTMENT IN PROJECTS
NOW IN OPERATION OR APPROVED IN THE WESTERN STATES (1938)
(FIGURES FROM U. S. CENSUS, BUREAU OF RECLAMATION AND OFFICE OF INDIAN AFFAIRS)

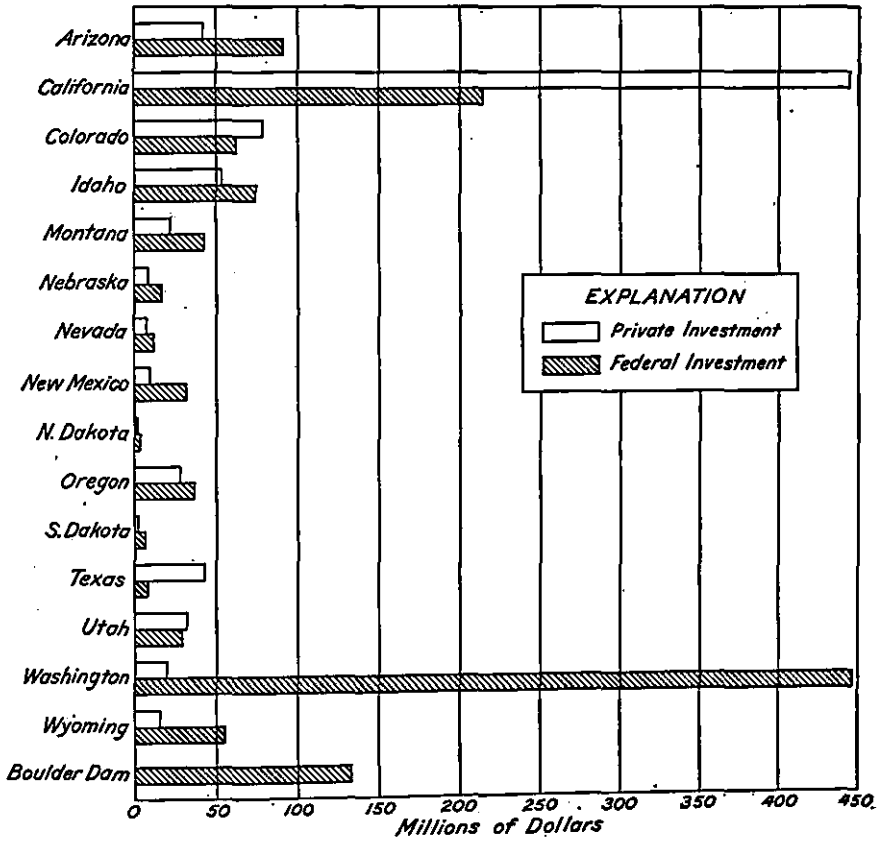


CHART II

*Private investment*¹ in irrigation-reclamation enterprises and ultimate Federal investment² in projects now in operation or approved in Western States (1938)

[Figures from U. S. Census, Bureau of Reclamation and Office of Indian Affairs]

State and source of investment:

Arizona:		
All private.....		\$42, 907, 941
All Federal.....		91, 455, 496
California:		
All private.....		444, 799, 640
All Federal.....		214, 059, 074
Colorado:		
All private.....		75, 826, 908
All Federal.....		62, 953, 748
Idaho:		
All private.....		53, 150, 418
All Federal.....		70, 484, 929
Montana:		
All private.....		22, 403, 601
All Federal.....		43, 991, 601

¹ Private investment reported by census, 1930; change since has been negligible.
² Includes estimated ultimate cost of power facilities in projects under construction.

Private investment in irrigation-reclamation enterprises and ultimate Federal investment in projects now in operation or approved in Western States (1938)—Con.

State and source of investment—Continued.

Nebraska:		
All private.....		\$7, 782, 751
All Federal.....		16, 304, 734
Nevada:		
All private.....		7, 329, 858
All Federal.....		12, 090, 545
New Mexico:		
All private.....		7, 917, 963
All Federal.....		31, 905, 513
North Dakota:		
All private.....		55, 091
All Federal.....		2, 291, 723
Oregon:		
All private.....		27, 346, 251
All Federal.....		35, 255, 271
South Dakota:		
All private.....		434, 377
All Federal.....		5, 539, 613
Texas:		
All private.....		42, 783, 919
All Federal.....		8, 821, 093
Utah:		
All private.....		30, 487, 839
All Federal.....		29, 926, 164
Washington:		
All private.....		19, 526, 454
All Federal.....		445, 153, 237
Wyoming:		
All private.....		16, 093, 560
All Federal.....		54, 501, 718
Boulder Dam ³		132, 160, 000
Total:		
All private.....	\$798, 846, 571	
All Federal:		
Reclamation projects.....	\$1, 037, 405, 296	
Boulder Dam ³	132, 160, 000	
Indian projects.....	87, 329, 163	
Total, Federal ⁴		1, 256, 894, 459
Grand total.....		\$2, 055, 741, 030

³ Boulder Dam constructed under special act of Congress and is not credited to any one State, as it affects 7 States of Colorado River Basin.

⁴ Includes costs written off under Adjustment Act of 1926.

APPENDIX 5. IRRIGABLE AREAS DEPENDENT ON FEDERAL PROJECTS

With the completion of current construction programs, Federal and Indian reclamation projects will be prepared to water in whole or in part about 40 percent of the acreage in 15 Western States for which it is anticipated water supplies will be available at that time.

The remaining 60 percent is included in areas in irrigation districts dependent for water wholly on systems ⁴ other than those constructed by Federal agencies.

⁴ Estimates based on report on "Irrigation of Agricultural Lands," U. S. Bureau of the Census, 1930.

Since 1911, when the Warren Act authorized the sale of surplus water available at Federal reclamation works, the Bureau of Reclamation has provided supplemental supplies for areas already irrigated by private⁵ enterprises. Expansion of this activity through the present construction program will account for much of the increase in the acreage dependent upon Federal projects.

In 1937, the irrigable area for which Federal works were prepared to supply water was approximately 18 percent of the total for which all agencies, public and private, had constructed facilities.

No material increase in the areas wholly dependent on nongovernmental works is anticipated, but the acreage to be watered by Federal works will be substantially expanded.

The irrigable area within Federal projects will be increased from 2,192,000 to 4,666,000 acres, while that for which supplemental water will be available will be increased from 1,575,000 to more than 5,256,000 acres.⁶

The irrigable area within Indian projects will be increased to approximately 1,200,000 acres.⁷

Chart III, with the accompanying tabulation, presents a comparison of the irrigable areas in the 15 States in which Federal reclamation projects are operating, showing: (1) That wholly dependent on works operated by private agencies; (2) that within private districts receiving supplemental supply from Federal reclamation works; and (3) that within Federal reclamation and Indian irrigation projects.

Chart IV, with the accompanying tabulation, presents by States a comparison of irrigable acreages in the several classifications on completion of the current construction program of the Bureau of Reclamation and Office of Indian Affairs.

The irrigable area expected to be wholly dependent on private irrigation enterprises will be reduced from 20,986,000 acres to less than 17,400,000; that scheduled to receive supplemental water from reclamation works will be more than trebled; and that area within reclamation and Indian projects will be increased by about 3,000,000 acres.

Irrigable¹ land of private irrigation enterprises,² area dependent on Federal works for supplemental water, and area within Federal reclamation and Indian irrigation projects (1937)

[Figures from U. S. Census, Bureau of Reclamation, and Office of Indian Affairs]

State and character of irrigation service:

	<i>Acres</i>
Arizona:	
All private.....	339, 690
Federal, supplemental.....	94, 132
All Federal.....	421, 116
State total.....	854, 938

¹ Area for which water was available; Indian lands under constructed canals.

² Private investment reported by census, 1930; change since has been negligible.

³ "Private" used to designate all districts other than those affected by Federal operations.

⁴ Summarized Data, Federal Reclamation Projects, Bureau of Reclamation, January 15, 1939.

⁷ Annual Report of the Secretary of the Interior, 1938, p. 222.

IRRIGABLE LAND OF PRIVATE IRRIGATION ENTERPRISES, AREA DEPENDENT ON FEDERAL WORKS FOR SUPPLEMENTAL WATER AND AREA WITHIN FEDERAL RECLAMATION AND INDIAN IRRIGATION PROJECTS (1937)
 (FIGURES FROM U. S. CENSUS, BUREAU OF RECLAMATION AND OFFICE OF INDIAN AFFAIRS)

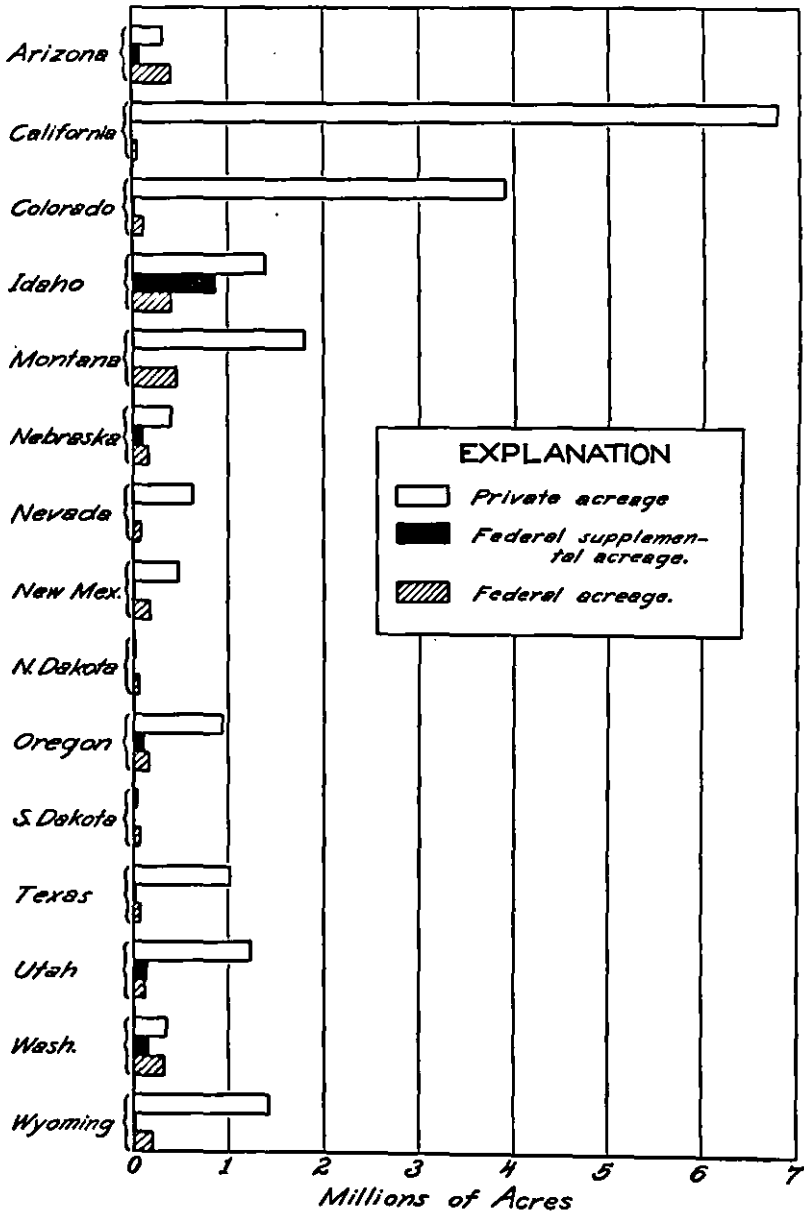


CHART III

Irrigable land of private irrigation enterprises, area dependent on Federal works for supplemental water, and area within Federal reclamation and Indian irrigation projects (1937)—Continued

State and character of irrigation service—Continued.

	<i>Acres</i>
California:	
All private.....	6,765,440
Federal, supplemental.....	
All Federal.....	68,435
State total.....	<u>6,833,875</u>
Colorado:	
All private.....	3,926,920
Federal, supplemental.....	20,077
All Federal.....	110,391
State total.....	<u>4,057,388</u>
Idaho:	
All private.....	1,400,459
Federal, supplemental.....	884,565
All Federal.....	418,598
State total.....	<u>2,703,622</u>
Montana:	
All private.....	1,807,374
Federal, supplemental.....	
All Federal.....	486,021
State total.....	<u>2,293,395</u>
Nebraska:	
All private.....	418,404
Federal, supplemental.....	104,779
All Federal.....	183,926
State total.....	<u>707,109</u>
Nevada:	
All private.....	636,584
Federal, supplemental.....	
All Federal.....	85,715
State total.....	<u>722,299</u>
New Mexico:	
All private.....	498,625
Federal, supplemental.....	5,000
All Federal.....	179,496
State total.....	<u>683,121</u>
North Dakota:	
All private.....	3,685
Federal, supplemental.....	
All Federal.....	20,321
State total.....	<u>24,006</u>
Oregon:	
All private.....	957,323
Federal, supplemental.....	101,930
All Federal.....	165,918
State total.....	<u>1,223,241</u>

Irrigable land of private irrigation enterprises, area dependent on Federal works for supplemental water, and area within Federal reclamation and Indian irrigation projects (1937)—Continued

State and character of irrigation service—Continued.

	<i>Acres</i>
South Dakota:	
All private.....	35, 050
Federal, supplemental.....	-----
All Federal.....	73, 406
State total.....	<u>108, 406</u>
Texas:	
All private.....	1, 088, 415
Federal, supplemental.....	23, 000
All Federal.....	74, 859
State total.....	<u>1, 186, 274</u>
Utah:	
All private.....	1, 249, 786
Federal, supplemental.....	153, 045
All Federal.....	132, 147
State total.....	<u>1, 534, 978</u>
Washington:	
All private.....	371, 245
Federal, supplemental.....	172, 627
All Federal.....	349, 099
State total.....	<u>792, 969</u>
Wyoming:	
All private.....	1, 436, 292
Federal, supplemental.....	16, 500
All Federal.....	207, 698
State total.....	<u>1, 660, 490</u>
Totals:	
All private, irrigable acres.....	20, 986, 698
Federal supplemental, irrigable acres.....	1, 575, 655
All Federal, irrigable acres.....	2, 977, 146
Reclamation project area, irrigable acres.....	2, 192, 759
Indian project area, irrigable acres.....	784, 387

IRRIGABLE LAND IN PRIVATE IRRIGATION ENTERPRISES
 ULTIMATE AREA TO BE SUPPLIED SUPPLEMENTAL WATER AND
 AREA WITHIN FEDERAL AND INDIAN IRRIGATION PROJECTS
 IN OPERATION OR APPROVED (1938)

(FIGURES FROM U. S. CENSUS, BUREAU OF RECLAMATION AND OFFICE OF INDIAN AFFAIRS)

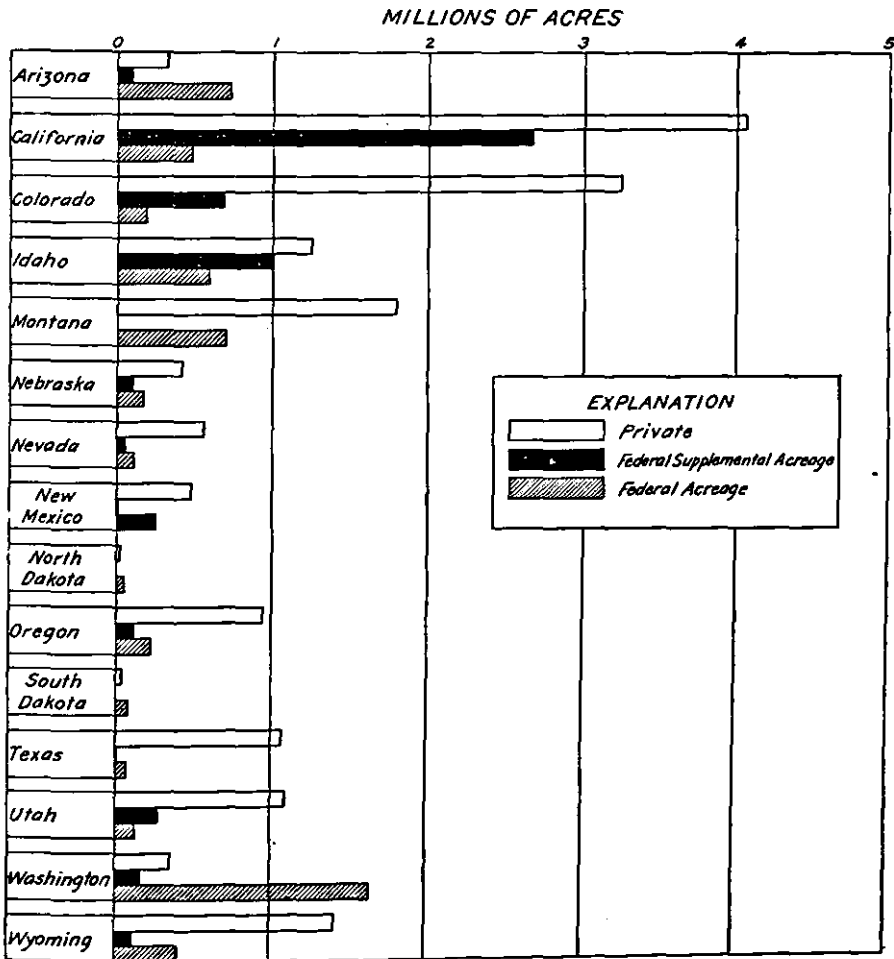


CHART IV

Irrigable¹ land in private enterprises,² ultimate area to be supplied supplemental³ water, and area⁴ within Federal and Indian irrigation projects in operation or approved (1938)

[Figures from U. S. Census, Bureau of Reclamation, and Office of Indian Affairs]

State, and character of irrigation:

	<i>Acres</i>
Arizona:	
All private.....	339, 690
Federal, supplemental.....	94, 132
All Federal.....	742, 228
State total.....	<u>1, 176, 050</u>
California:	
All private.....	4, 090, 870
Federal, supplemental.....	2, 674, 530
All Federal.....	458, 829
State total.....	<u>7, 240, 237</u>
Colorado:	
All private.....	3, 264, 920
Federal, supplemental.....	682, 077
All Federal.....	177, 893
State total.....	<u>4, 123, 890</u>
Idaho:	
All private.....	1, 270, 459
Federal, supplemental.....	1, 014, 565
All Federal.....	593, 846
State total.....	<u>2, 808, 870</u>
Montana:	
All private.....	1, 807, 374
Federal, supplemental.....	709, 719
All Federal.....	709, 719
State total.....	<u>2, 517, 093</u>
Nebraska:	
All private.....	418, 404
Federal, supplemental.....	104, 779
All Federal.....	183, 926
State total.....	<u>707, 109</u>
Nevada:	
All private.....	574, 397
Federal, supplemental.....	62, 167
All Federal.....	137, 027
State total.....	<u>773, 611</u>
New Mexico:	
All private.....	498, 625
Federal, supplemental.....	5, 000
All Federal.....	254, 731
State total.....	<u>758, 356</u>

¹ Area for which enterprises are or will be prepared to supply water.

² Represents area reported by Census Bureau, 1930, less area being, or to be, supplied supplemental water by Federal reclamation works.

³ Includes areas now receiving supplemental water and those included in current plans.

⁴ Includes estimated areas for which Federal projects are, or will be, prepared to supply water.

Irrigable land in private enterprises, ultimate area to be supplied, supplemental water, and area within Federal and Indian irrigation projects in operation or approved (1938)—Continued

State, and character of irrigation—Continued

	<i>Acres</i>
North Dakota:	
All private.....	3, 685
Federal, supplemental.....	
All Federal.....	20, 321
State total.....	<u>24, 006</u>
Oregon:	
All private.....	957, 323
Federal, supplemental.....	113, 930
All Federal.....	236, 154
State total.....	<u>1, 307, 407</u>
South Dakota:	
All private.....	35, 050
Federal, supplemental.....	
All Federal.....	80, 353
State total.....	<u>115, 403</u>
Texas:	
All private.....	1, 088, 415
Federal, supplemental.....	23, 000
All Federal.....	74, 859
State total.....	<u>1, 186, 274</u>
Utah:	
All private.....	1, 109, 695
Federal, supplemental.....	293, 136
All Federal.....	139, 401
State total.....	<u>1, 542, 232</u>
Washington:	
All private.....	371, 243
Federal, supplemental.....	172, 627
All Federal.....	1, 650, 233
State total.....	<u>2, 194, 093</u>
Wyoming:	
All private.....	1, 436, 292
Federal, supplemental.....	16, 500
All Federal.....	406, 116
State total.....	<u>1, 858, 908</u>
Total:	
All private.....	17, 317, 848
Federal, supplemental.....	5, 256, 443
All Federal.....	<u>5, 865, 636</u>
Reclamation project land.....	4, 666, 819
Indian project land.....	1, 198, 817
Grand total.....	<u>28, 439, 927</u>

APPENDIX 6

NATIONAL AND REGIONAL ORGANIZATIONS ENDORSE RECLAMATION

MISSISSIPPI VALLEY ASSOCIATION

Mississippi Valley Association, representing 22 States, in resolutions adopted at twentieth annual meeting, St. Louis, Mo., November 21 to 22, 1938, included the following statements:

The streams of 10 of the arid and semiarid States flow into the Mississippi River and therefore constitute an important part of the Mississippi Valley, the interests of which are represented by the Mississippi Valley Association.

These waters can be put to important use in the reclamation of the arid and semiarid lands by irrigation and allied uses.

The Bureau of Reclamation, of the Department of the Interior, in carrying out the purposes of the Federal Reclamation Act, undertakes only such irrigation projects as are found to be self-liquidating. Through the construction of such projects, use of land and water resources of the area is provided, including the conservation of water for domestic and irrigation purposes, the restoring of ground waters, water retardation, increase of low flow for navigation, and flood control.

The committee on use of water resources of the Mississippi Valley Association recommends that the association approve and endorse the program of the Bureau of Reclamation, Department of the Interior, for self-liquidating irrigation projects so badly needed throughout the arid and semiarid regions of the Western States.

The association subsequently adopted the resolution recommended, as follows:

We approve and endorse the program of the Bureau of Reclamation, Department of the Interior, for self-liquidating irrigation projects so badly needed throughout the arid and semiarid regions of the Western States.

OHIO VALLEY CONSERVATION AND FLOOD CONTROL CONGRESS

Ohio Valley Conservation and Flood Control Congress, representing four States, in resolutions adopted at the sixth annual meeting, Huntington, W. Va., January 27, 1938, included this statement:

Resolved, That we recommend to the Congress that future appropriations be limited to projects that add to the resources of the Nation, such as flood control, rivers and harbors, reclamation, sewage-disposal plants, highways, public buildings, etc.

NATIONAL RIVERS AND HARBORS CONGRESS

National Rivers and Harbors Congress, representing all States and possessions, in resolutions adopted at the thirty-third annual meeting, Washington, D. C., January 20-21, 1938, incorporated the following statements:

The Bureau of Reclamation of the Department of the Interior, in carrying out the purposes of the Federal Reclamation Act, undertakes only such irrigation projects as are believed to be self-liquidating and, through the construction of such projects, the highest use of the lands and water resources of the area is provided, including the conservation of water for domestic and irrigation purposes, flood-control, and river regulation, including pollution abatement, water retardation, increase of flow for navigation, and such other purposes as may be present.

Because of the migration of farm families from the drought areas and from submarginal land, the demand for irrigated land is now far in excess of what the new Federal projects can supply due to inadequate appropriations to carry the work forward as rapidly as could be economically pursued.

The National Rivers and Harbors Congress approves the program of the Bureau of Reclamation, urges that the program be speeded up so that farm families made homeless by drought and erosion be given an opportunity for a new start on land with an assured water supply, and urges Congress to make increased appropriations to accomplish the above purpose.

CHAMBER OF COMMERCE OF UNITED STATES

The Chamber of Commerce of United States, representing all 48 States, in resolutions adopted at the twenty-sixth annual convention, Washington, D. C., May 2-5, 1938, states:

In any reckoning of national resources, the water and the land hold foremost place. The United States should develop land policies based upon studied considerations and suited to differing regional advantage. The beneficial use of water upon the land is a composite problem, for the solution of which the Federal Government and the States, in any programs of useful public works, may wisely expend public funds upon carefully planned projects that will stand the test of economically sound investments or repayment arranged upon a business basis. Experience teaches that projects so devised not only benefit the section where they are located, but contribute as well to the wealth and welfare of the whole country.

APPENDIX 7

[United States Department of Agriculture, Agricultural Adjustment Administration, Washington, D. C.]

THE FACTS ON IRRIGATED LAND ⁸

[Facts in this statement were compiled by the Agricultural Adjustment Administration]

The impression prevails among some farmers that the Federal Government is bringing many millions of acres of new lands into production through irrigation. They therefore ask: "Why should we curtail the production of wheat, corn, cotton, and other soil-depleting crops of which excess quantities are being produced, when increased plantings of such crops may be taking place on the irrigated areas?"

In 1937, after the Federal Government had been building reclamation projects for 35 years, the land in crops receiving water from Federal enterprises totaled 3,043,000 acres, or less than 1 percent of the total land in crops in the country that year. Moreover, this figure included 1,342,072 acres already irrigated by private projects which, under the Warren Act, merely purchased additional water from Federal storage reservoirs, so that the 1,700,928 acres actually a part of the Federal projects represented only half of 1 percent of the 341,000,000 acres harvested in 1937. Approximately 17,000,000 acres of other crop land were also irrigated in 1937 but the water for these was furnished by private, cooperative, city, or State irrigation enterprises. The irrigation projects of the Indian Service furnish an adequate water supply to about 500,000 acres of land.

The only new land brought under irrigation by Federal projects during the past 5 years has been on projects authorized and started before 1933.

With reference to the future, the Bureau of Reclamation recently released data showing that only about 1,000,000 acres of additional lands are expected to be brought under irrigation by 1948 by reclamation projects now under construction, or which have been under construction during the past 4 years.

GRAND COULEE IRRIGATION PROJECT TO BE FINISHED 1964

Only 26,804 of the 1,000,000 acres mentioned are to be brought under irrigation during 1938; 26,123 in 1939; 20,000 in 1940; 20,000

⁸ Undated memorandum circulated in 1938-39.

in 1941; and 56,800 in 1942. In 1943, when the Grand Coulee Dam-Columbia Basin project is expected to be able to furnish water for its first unit of land, consisting of 150,000 acres, the total additional lands brought in will be 200,000 acres. Thereafter, until 1948, the additional acres, including Grand Coulee units, will run as follows: 1944, 110,000 acres; 1945, 116,000; 1946, 100,000; 1947, 90,000; 1948, 85,000. After 1948, the Grand Coulee will continue to bring under irrigation 50,000 acres annually until the project is completed in 1964. The area in the Columbia Basin for which the Grand Coulee will furnish water is the major unimproved area in the United States subject to irrigation.

Construction of the main canal on the All-American Canal, California (Boulder Canyon project), which was authorized December 21, 1928, and which is now nearing completion, and of the Coachella branch canal, which has yet to be undertaken, will provide water for the irrigation of 521,000 acres of the Imperial Valley and 152,930 acres in the Coachella Valley. The Imperial Valley lands are now, and have been since 1901, irrigated by the Imperial Canal, a private enterprise. About 16,000 acres in the Coachella Valley are now irrigated by pumping from wells, leaving approximately 137,000 acres of additional lands to come in. According to the Bureau of Reclamation, the canal to the Coachella Valley will be completed in 1942, but construction of a lateral distribution system has not been authorized. It is believed it will probably be several years after the completion of the canal in 1942 before the entire area in the Coachella Valley is under irrigation.

MANY THOUSANDS OF HOMELESS FARMERS NEED FARMS

New farm opportunities are urgently needed today for the many thousands of families driven from their farms in the Great Plains by the droughts of the past few years. The major function of Federal reclamation in the national land-use program is to provide such opportunities. Commissioner of Reclamation John C. Page has stated, however, that the present construction program cannot make new lands available fast enough to take care of the demand on the part of these unfortunate families, and that even if the Grand Coulee Dam-Columbia Basin project, by far the largest of the reclamation projects, were already finished it would provide homes for less than half of the farm families forced out of the Great Plains alone. The Farm Security Administration recently estimated that 58,400 families have migrated into 7 far Western States from drought areas. It is the opinion of the Farm Security Administration that almost all of these drought immigrants could, under favorable farming conditions and with adequate assistance, once again become self-supporting.

The acres now irrigated by Federal projects support directly 900,000 persons living on farms and in towns on the projects so that most of the food and feed crops produced on these acres are needed for local consumption. These irrigated acres, moreover, are markets for foodstuffs, such as pork and pork products, from Midwest and other sections of the country.

IRRIGATED ACREAGE LARGELY DEVOTED TO FEED CROPS

Hay and forage crops are the principal crops, from the standpoint of acreage, grown on the irrigated lands of the West. In 1936 approximately 50 percent of the acreage cropped on the Federal reclamation projects was devoted to these crops, chiefly alfalfa. Approximately 11 percent of the acres were in wheat, about 10 percent in cotton, and less than 4 percent in corn. The remaining acreage of about 25 percent was in sugar beets, barley, oats, vegetables, fruits, and other crops. Just how insignificant, from a competitive standpoint, is the wheat, cotton, and corn production on these projects is realized when it is known that in the drought year 1936 the wheat crop harvested on the irrigated acres of these projects totaled only 4,374,435 bushels; that of cotton, 176,449 bales; and that of corn, 1,730,232 bushels. The Federal reclamation enterprises' wheat crop represented less than seven-tenths of 1 percent, that of cotton about 1½ percent, and that of corn considerably less than one-tenth of 1 percent of the total United States production of these commodities that year. It should not be overlooked that farmers in these areas also take part in the A. A. A. farm program.

MANY RECLAMATION PROJECTS HAVE SEVERAL PURPOSES

Many of the Federal enterprises are "multiple-purpose" projects. The Grand Coulee Dam, for instance, is being built for hydroelectric power and to improve navigation, as well as to irrigate lands. The Central Valley, Calif., project has, besides the purposes mentioned, also that of providing protection from salt-water intrusion into delta lands. This enterprise, like several others, is known as a "rescue project" because it is intended to bring additional water to areas that formerly enjoyed an ample supply of water. The very existence of some of these areas is threatened by the lack of sufficient water.

SUMMARY

It can be seen, therefore, that the amount of land brought under irrigation by the Federal Government in the past, or which is likely to be brought under in the future, is relatively small; that much of it was previously irrigated; that the principal crops grown on the irrigated lands, from an acreage standpoint, are hay and forage, while the staple crops of which there are exportable surpluses in other regions are produced in very small amounts; that the families on the Federal projects are important consumers of farm products from the Midwest and other parts of the country; and, finally, that the lands being brought under irrigation by the Federal Government are greatly needed to provide new farm opportunities for many thousands of dispossessed farmers wandering throughout the West.

Inasmuch as a large part of it was unproductive and idle land no mention has thus far been made of the approximately 9,100,000 acres of land acquired by the Resettlement Administration for conversion to other uses, including grazing, forestry, recreation, and wildlife conservation. However, more than 1,000,000 acres of this land was in crops. The Secretary of Agriculture, under authority of the Bankhead-Jones Act, has approved land-utilization projects involving the purchase of approximately 2,200,000 acres more, located for the most

part in the Great Plains. In these projects, marginal land or land not primarily suited to cultivation is being purchased in order to effect much-needed programs of agricultural rehabilitation.

However, even were the Federal reclamation projects both unnecessary and a menace to farmers in other areas, it would still be imperative for those farmers to protect and improve the soil on their own farms. The Agricultural Adjustment Administration farm program enables them to do this by compensating them for planting fewer acres to soil-depleting crops and more acres to soil-conserving grasses and legumes.

APPENDIX 8

RECLAMATION FULFILLS ITS MISSION

[By John C. Page, Commissioner, Bureau of Reclamation. Reprinted from the Reclamation Era, July 1938]

On June 17, 1902, when President Theodore Roosevelt signed the Federal Reclamation Act, high hopes were held that important and lasting benefits would be derived from the conservation of the arid soils and the scant waters of the West. It was hoped that new opportunities to gain an American standard of living could be made available to large numbers of people who might find homes on the reclaimed land; that the natural handicaps of these big Western States could, in part, be overcome through the construction of soundly planned irrigation works with public funds on a self-liquidating basis; and that through building homes and communities the United States could be made a better and richer country.

Thirty-six years have passed. Let us look at the Federal Reclamation program from this vantage point in time and ask ourselves, "Have events justified the expectations of 1902?"

Since the Bureau of Reclamation was organized within the Department of the Interior, 34 irrigation projects have been constructed to serve more than 3,000,000 acres of lands which recently were desert.

On the projects which have been put in operation, 900,000 people make their homes and find their livelihood on nearly 50,000 irrigated farms and in 254 towns and cities which serve and are dependent upon them. These people have built communities which support 859 public schools and 996 churches. Their banks at the close of the past year had a total of deposits of more than \$225,000,000.

These are normal American communities where men live and work; where they earn and achieve a measure of prosperity. These are the permanent improvements of reclamation. Before analyzing these results and attempting to determine their significance, let us see what the peculiar western conditions were which made this program necessary.

NEED GAVE RISE TO RECLAMATION

Here lay 700,000,000 acres which were arid or semiarid, or which were mountainous wastes. Most of the slight water supply was received during winter months and, with the coming of spring, it collected into a few streams and ran off, without benefit to mankind, to the sea. Only through the damming of streams, the storage of spring floods, and their distribution through canals could a little of the land be made productive and be made to support a considerable population.

As the receding frontier drew the American people westward, they came upon the arid and semiarid region, trapped its waters for fur; explored its mountains for metals; and cut into its forests, but they passed rapidly over its deserts. They crossed miles upon miles of arid land, hoping to find fresh fields; they pressed onward until they realized that it was upon the foundation of this desert that the permanent civilization in the West must be built. Then they began the easy stream diversions and irrigated the low-lying valleys and the benches near the big rivers. Gradually the irrigation systems became more complicated. Finally the unregulated flow of the streams became insufficient to the needs of developments relying upon them, and storage works were required.

It was at about this point that the Government adopted its reclamation policy. Summarized, this policy was to invest funds received from the sale of public lands in the Western States in irrigation. These funds were not to be expended as gifts but were to be placed in a revolving fund into which the settlers upon the lands reclaimed must repay the cost of the construction of their projects. It was a simple and businesslike arrangement and, although the Reclamation Act has been amended, the principle remains unchanged.

Look at a map of the West now. The populous areas, the cities and the farms, are gathered together in spots where irrigation can be practiced, where water can be taken from the rivers or from the ground and applied to the arid land.

Of the 700,000,000 acres in the West, 20,000,000 now are irrigated, and this small fraction forms the major support for 12,000,000 people. Surveys show that some unused water remains available—sufficient in the estimation of the Bureau of Reclamation to irrigate, with projects which now can be considered feasible, an additional 10,000,000 acres. Beyond the boundaries of these projects as yet unbuilt stretch the untracked desert and the short-grass plateaus, and above them rise the peaks of a maze of mountain ranges. Hundreds of millions of acres must forever remain uncultivated.

The growth of the West since the shaking-down process which followed the gold rush to California has been keyed to its irrigation development. This relationship must be retained in the future. The Bureau of Reclamation has played an increasingly important part since 1902 in the widening of the agricultural base for this growing section. For 15 years it has been the principal agency in the field of irrigation construction. It is likely to remain such in the future because the remaining developments generally are large and costly, involving too many complications to attract private finances and being too difficult to be undertaken cooperatively by irrigation districts.

RESULTS OF PASSAGE OF RECLAMATION ACT

What has been done under the Federal Reclamation Act, then, assumes a greater importance. To date the Bureau of Reclamation has built 138 storage and diversion dams, 20,000 miles of large canals, and has expended 237 millions of dollars on projects which have gone into operation and are settled. With the expenditure of these funds it has contributed 15 percent of the total of irrigated land in all of the arid and semiarid region.

Let us analyze these figures a little more carefully. The construction of the irrigation systems for these projects has cost less than \$263 for each person who has been provided a home and, moreover, this expenditure is to be repaid. Of the \$263 per capita outlay for construction, about \$55 already has been repaid, and that represents within 2 percent of all the money that has become due and payable. The provision of homes and new opportunities was the fundamental objective of the Reclamation Act. They have been provided for 900,000 persons and, for each of these, products of a cash value of more than \$2,500 have been harvested from lands which recently were useless. In addition, taxable values have been created in the States exceeding \$400 for each and every one of the persons living on the Federal reclamation projects—on farms and in the cities and towns which the farms have created.

What does this mean to the public welfare? Here are a few facts. During the severe drought of the Great Plains in 1936, the President's Great Plains Committee found that in counties where adequate irrigation systems had been built and were in operation only 5 percent of the taxes were delinquent, while in many counties adjacent or near by where there were no irrigated lands tax delinquencies amounted to 95 percent, and this difference resulted despite the fact that the appraised value of irrigated land generally was more than 10 times as high as that of dry-farming and grazing lands. The support provided by irrigation for established government and institutions in this semiarid region becomes more obvious under such conditions. Irrigation lends a stability without which the very governmental structure of the West, as we know it today, could not exist.

FINDINGS OF REPAYMENT COMMISSION

Another bit of evidence: The Repayment Commission, in the chapter devoted to general observations in its recent report, said that its survey of relief conditions on Federal reclamation projects revealed that bona fide farm operators in these areas were forced on relief only in a few areas. These isolated cases, it added, resulted from the fact that the farmer as a new settler who had not had the opportunity to bring his land into production, or who had been subjected to a condition over which he had no control. The records of the Bureau of Reclamation show that the average gross return per acre on its projects is more than 2½ times that received by the farmer the country over. It is realized that the overhead costs of the irrigation farmer are necessarily higher than those of farmers who do not have to buy and handle their water, but in the light of the observation of the Repayment Commission it can be stated that these projects have brought a measure of prosperity to those who sought the opportunities they offered.

One can pick three States out of the arid region, combine their populations, and find that the total is less than the 900,000 who live on Federal reclamation projects. This comparison becomes even more striking when it is realized that in each of the three States there is one Federal reclamation project or more supporting a high percentage of that State's people.

The provision of homes and new opportunities, the support of Government and institutions, and the stabilization of the economy

of a wide area are contributions to the social welfare not only of the project areas, the counties and States in which they lie, but also of the whole United States.

Remember, too, that the social value of a reclamation project does not depreciate. These projects are permanent improvements which will continue to provide homes, employment, and a decent living for their people.

These values could be belittled only if by their creation other values elsewhere were destroyed. This is not the case. The national enrichment, social and economic, which has come through the Federal reclamation policy is clear gain.

The agriculture of the irrigated sections of the West complements that of other regions of the country.

Livestock is a major western industry. Half of the feed which supports this industry is produced on the 20,000,000 acres of irrigated land and the other half is obtained from the public ranges, hundreds of millions of acres in extent. These Western States provide the feeder stock for the pens of the midwestern farmer.

SPECIALTY CROPS PRODUCED UNDER IRRIGATION

General farming and the production of specialty crops, which can be shipped to distant markets for a cash return, occupy the irrigation farmer. The big staple crops, of which other areas produce exportable surpluses, are not grown in appreciable quantities on irrigated land. For example, no tobacco is grown in the West. The Federal reclamation projects do not produce sufficient wheat, generally, for their own needs. The large western cities, which are the nearest markets for the products of irrigation, buy large quantities of pork and pork products from the Mississippi River Valley. Some cotton is grown, but most of it is of the long-staple variety not produced elsewhere in the United States.

Every project has its specialty crop, and they are of wide variety. They range from citrus fruits to sugar beets. Winter truck is an important crop of these projects. On first thought it might be believed that the production of cherries in Idaho, or lettuce in California, or cantaloupes in Colorado, and their shipment throughout the country might provide a source of competition with gardeners and orchardists near the large cities of the East and Middle West. The products of California, Colorado, and Idaho can be sold in Boston, New York, and Chicago, however, only after being freighted from 1,000 to 3,000 miles. To bear the freight charge they must be produced out of season so far as eastern markets are concerned. They cannot compete with locally grown produce in season, and they never attempt to do so.

The growth of the West has not been made at the expense of other sections. It has, on the other hand, reflected the growth of the country. There are insufficient opportunities now in the West to take care of more than a small fraction of those seeking them. Last year 69 farm units were opened for settlement on the Tule Lake division of the Klamath project in the extreme northern section of California. More than 3,000 home seekers applied on the first day for consideration in connection with the assignment of these farms. At this time there are, in the West, more than 50,000 farm families which have been driven by drought from their homes in the Great Plains alone. Few of them can hope to find permanent lodgment on farms.

ECONOMIC RESULTS OF CONSTRUCTION PROGRAM

We are now engaged in the greatest construction program in the history of the Bureau of Reclamation. Projects under construction will, upon their completion, add an additional 2,500,000 acres to the watered area of these States. This construction program also will provide supplemental water for about as much more land now irrigated but with insufficient water to produce good crops. We look forward to public betterments to grow from these projects with a confidence based on the experience of the past.

When these projects are completed, opportunities will be provided, according to our estimates, for a total of 825,000 people on 41,600 farms and in cities and towns, as yet unlocated.

Some of the new projects will make settlement opportunities within a year or two, but some will take much longer. There is no possibility that all of the new lands could be thrown open at once even though it might be desirable to do so. On the contrary, they will be made available in steady progression and the last of those to be irrigated by the Grand Coulee Dam may not be ready for 20 years. Such a large and complicated development cannot be completed quickly. If it were possible by some engineering legerdemain to complete overnight the network of canals in order that we might deliver water to each farm in the 1,200,000 acres to be served by Grand Coulee Dam, we would not be able to provide farms for more than three-fifths of the families which are now refugees from the Great Plains drought alone.

One function of the Bureau has been to investigate the water and soil resources of the West and to plan for their development. The program growing out of this work is of long range. No effort has been made to keep the construction abreast of the demand for farm homes. Ultimately any such attempt must fail. As we have seen with respect to the Grand Coulee Dam, the largest unit possible of inclusion in any such program, the development must proceed slowly, while the needs may become quickly urgent. The best that can be done is to provide a sound plan and to spread the opportunities as intelligently and as widely as can be done.

BENEFITS OF RECLAMATION

No review of the contributions made by Federal reclamation can be complete without the mention of benefits incidental to the construction or the operation of the projects. Among these are found widespread employment in building the projects and in the manufacture and transportation of materials. Among them also are contributions through the provision of flood control; by the aid of navigation; to the improvement of domestic water supplies for urban areas; through the creation of recreational centers and wildlife refuges; and through the generation of hydroelectric power. I shall dwell for a moment only on the latter, since it has received widespread public attention. But the others should not be overlooked.

From the outset projects built by the Bureau of Reclamation have grown progressively more complicated and complex. This is necessarily so, since larger rivers had to be dealt with. Wherever a dam is built, a power head is created. The very scarcity of water in the West makes it a prudent policy to put this resource to multiple uses wherever feasible. It is not always economically feasible to make use

of the power head created by an irrigation dam, but in recent years it has been proved feasible in an increasing number of instances. Wherever this is true, the power plants have been installed.

The first power plant on a reclamation project was built to provide energy needed in the construction of an early dam. When this work was completed the plant was taken over by the settlers on the project who have enlarged it and who are still operating it. Another power plant was constructed to run pumps which were an integral part of the irrigation system of a second project. This plant is still in operation. It also has been enlarged, and the water users are producing energy in excess of the pumping requirements. This energy is being sold. Power developments such as these have had a marked influence on the progress of the projects. On the Minidoka project there is scarcely a farmhouse which is not lighted by electricity and scarcely a farm which does not have motors to run its heavy machinery.

Considerably later, when large dams were begun, power generation was considered in the planning of the project and the sale of power was taken into account when the calculations were made of the return of the project costs.

More than a score of power plants are being operated on our projects. Several of them are important, and one of them, that at Boulder Dam, is very large. In connection with five additional projects now being built, important power developments are being made. These are at Grand Coulee Dam in Washington, at Shasta Dam on the Central Valley project in California, on the Colorado-Big Thompson project in Colorado, at Seminole Dam on the Kendrick project in Wyoming, and at the Elephant Butte Dam on the Rio Grande project in New Mexico and Texas.

The output from these plants, like that at Boulder Dam, will be used in industries, in mining and smelting, in the lighting of city homes, and in rural electrification.

We believe that this byproduct of irrigation should be made available for widespread use in order that the benefit derived from the investment of public funds in the projects may be shared by the largest possible number.

Again pose the question: Have the expectations of 1902 with respect to the Federal reclamation program been fulfilled? Has it made new opportunities? Has it created new homes? Has it given the people an American standard of living? Has it improved their lot, and has it enriched the Nation?

The answer must be:

Yes; the hopes of 36 years ago have been realized and the promise of further fulfillment still remains.

APPENDIX 9

Consolidated statement by projects, of construction cost of irrigation works, other items reimbursable with construction, and amounts repayable

State and project	Construction cost to June 30, 1935	Operation and maintenance before public notice (net) to June 30, 1935	Operation and maintenance deficits and arrearages, and penalties to June 30, 1935	Construction revenues, contributed funds, and nonreimbursable appropriations (contra) to June 30, 1935	Abandoned works, nonreimbursable cost and authorized charge-offs	Total repayable to June 30, 1935
<i>Arizona</i>						
Gila	\$3,035,277.82					\$3,035,277.82
Salt River	18,016,754.58	\$115,993.50	\$1,023,020.02	\$2,312,096.81	\$382,097.31	16,461,673.98
Yuma auxiliary	902,060.50		590.36	1,085.47		901,565.39
<i>Arizona-California</i>						
Yuma	9,373,406.10	356,934.62	207,063.71	231,323.05		9,738,081.38
<i>California</i>						
Central Valley	2,770,059.65					2,770,059.65
Orland	2,401,049.67	11,432.99	57,581.60	28,414.77		2,418,783.41
<i>Colorado</i>						
Colorado-Big Thompson	223,072.26					223,072.26
Fruitgrowers Reservoir	29,631.19					29,631.19
Grand Valley	5,020,291.34	136,621.26	4,529.40	269,692.83	812,374.64	4,081,374.5
Piute River	255,408.22					255,408.22
Uncompahgre	8,366,469.00	311,103.02	196,563.91	25,063.87	1,260,700.93	7,586,220.13
<i>Idaho</i>						
Boise	16,686,396.71	422,263.46	903,699.42	792,000.48	82,393.64	17,137,985.29
Boise-Payotta	1,768,603.21					1,768,603.21
King Hill	1,905,918.80		110,122.51	28,187.27	1,967,854.04	1,862,804.92
Minidoka	19,232,057.90	318,253.10	611,036.90	2,024,298.14	2,288.15	18,134,761.61
Upper Snake River	2,006,645.03			933.32		2,005,711.71
<i>Kansas</i>						
Garden City	342,963.68	52,868.10		61,356.82	334,474.96	
<i>Montana</i>						
Bitter Root	947,641.05		516,637.95			1,464,279.00
Buffalo Rapids	186,296.42					186,296.42
Chain Lakes	798,215.68					798,215.68
Fronttown	263,272.77	3,433.39				266,706.16
Huntley	1,559,560.46	1,000.16	391,067.46	24,803.01	62,049.53	1,862,804.92
Milk River	6,924,191.50	437,027.74	101,062.03	74,400.81	1,735,969.31	5,651,911.15
Sun River	8,561,812.03	132,664.41	103,193.33	47,371.42	89,214.47	8,661,083.88
<i>Montana-North Dakota</i>						
Lower Yellowstone	3,685,433.14	16,355.12	922,893.29	105,746.13	382,254.00	4,113,971.18
<i>Nebraska-Wyoming</i>						
North Platte	19,331,704.12	743,294.42	1,516,486.06	619,045.25		20,972,439.37
<i>Nevada</i>						
Humboldt	1,160,641.77					1,160,641.77
Newlands	7,947,282.86	12,153.44	44,976.32	52,747.53	4,437,620.00	3,499,936.21
Truckee Storage	431,208.92			20,003.00		411,205.92
<i>New Mexico</i>						
Carlsbad	3,548,657.52	17,751.77	93,395.50	29,108.06	374,683.58	3,240,309.59
Hondo	552,491.68	32,852.01		633.03	571,787.66	
<i>New Mexico-Texas</i>						
Caballo Dam	1,811,183.04					1,811,183.04
Rio Grande	15,362,419.24	1297,857.81	364,631.65	1,151,358.63	344,900.97	13,932,833.48

¹ Contra.

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Consolidated statement by projects, of construction cost of irrigation works, other items reimbursable with construction, and amounts repayable—Continued

State and project	Construction cost to June 30, 1938	Operation and maintenance before public notice (net) to June 30, 1938	Operation and maintenance deficits and arrearages, and penalties to June 30, 1938	Construction revenues, contributed funds, and nonreimbursable appropriations (contra) to June 30, 1938	Abandoned works, nonreimbursable cost and authorized charge-offs	Total repayable to June 30, 1938
<i>North Dakota</i>						
Buford-Trenton.....	\$223,423.06	1 \$31.75		\$1,967.62	\$221,423.69	
Williston.....	517,630.09	1 165.00		104,606.76	412,858.33	
<i>Oregon</i>						
Baker.....	281,591.64			5,003.00		\$276,588.64
Burnt River.....	598,797.34			1,290.82		597,506.52
Deschutes.....	58,431.99					58,431.99
Stanfield.....	97,830.24					97,830.24
Umatilla.....	5,138,949.61		\$230,536.78	93,682.28	888,340.82	4,387,462.31
Vale.....	4,724,028.09	39,721.16	3,027.24	10,416.28		4,766,358.21
<i>Oregon-California</i>						
Klamath.....	6,552,064.48	91,084.79	85,433.41	279,188.69	7,499.72	6,441,897.27
<i>Oregon-Idaho</i>						
Owyhee.....	17,313,322.89		66,310.71	9,224.85		17,370,408.75
<i>South Dakota</i>						
Belle Fourche.....	4,528,145.51	1 1,989.03	676,577.53	27,383.80	379,031.58	4,706,318.63
<i>Utah</i>						
Hyrum.....	921,583.36			9,971.13		911,612.23
Moon Lake.....	1,416,733.47			8,093.18		1,408,640.29
Ogden.....	3,980,584.17	2,361.87		12,866.97		3,970,079.07
Provo River.....	698,589.02			30,897.67		667,691.35
Salt Lake Basin.....	2,915,885.40		5,897.20	46,160.77		2,875,621.83
Sanpete.....	270,891.86			1,284.40		269,607.46
Strawberry Valley.....	3,507,423.49	10,744.08	89,635.49	258,379.12		3,349,423.92
<i>Washington</i>						
Grand Coulee.....	60,613,865.45			143,593.38		60,470,272.07
Okanogan.....	1,452,129.45	1 47,766.87	28,882.64	7,496.28	997,861.70	425,887.24
Yakima.....	28,260,161.63	1 64,357.08	154,374.40	511,191.01	4,214.60	25,834,774.39
Yakima-Roza.....	3,656,462.63					3,656,462.63
<i>Wyoming</i>						
Kendrick.....	10,417,728.59			5,955.84		10,411,772.75
Riverton.....	5,359,668.40		129,052.72	22,739.65		5,465,981.47
Shoshone.....	10,084,126.54	35,244.37	467,236.88	646,655.96	1,545,129.47	8,404,821.36
Shoshone-Heart Mountain.....	1,784,726.56			120.00		1,784,606.56
<i>Boulder Canyon Project</i>						
Boulder Dam, power plant, etc.....	129,834,877.32			572,196.68		129,262,480.64
All-American Canal.....	23,519,095.05					23,519,095.05
Total.....	491,941,684.84	2,825,722.30	9,103,355.44	10,709,695.84	17,117,514.60	476,043,872.14

¹ Contra.

Statement of reclamation fund construction charges paid and unpaid as of June 30
1938

State and project	Amount due	Amount re- paid	Charges due and unpaid	Percent repaid of amount due
Arizona:				
Salt River.....	\$7,181,521.91	\$7,181,521.91		100.0
Yuma auxiliary.....	578,912.37	578,401.39	\$510.98	99.9
Arizona-California-Yuma.....	4,269,644.91	4,214,997.81	54,647.10	98.7
California: Orland.....	827,017.87	800,743.57	26,274.30	96.8
Colorado:				
Grand Valley.....	253,263.21	253,263.21		100.0
Uncompahgre.....	597,094.64	528,467.34	68,617.30	88.5
Idaho:				
Boise.....	4,342,457.07	4,327,154.75	15,302.32	99.6
Minidoka.....	8,546,349.27	8,451,046.45	95,302.82	98.9
Montana:				
Bitter Root.....	72,244.52	36,050.84	36,193.68	49.9
Huntley.....	589,090.93	588,300.17	790.76	99.9
Milk River.....	127,910.88	26,912.56	100,998.02	21.0
Sun River.....	312,030.90	308,717.51	3,313.39	98.9
Montana-North Dakota: Lower Yellowstone.....	392,750.60	305,109.05	27,641.55	93.0
Nebraska-Wyoming: North Platte.....	4,532,129.60	4,452,694.36	79,435.24	98.2
Nevada: Newlands.....	1,286,113.13	1,282,101.64	4,011.49	99.8
New Mexico: Carlsbad.....	903,117.37	891,726.67	11,390.70	98.7
New Mexico-Texas: Rio Grande.....	3,498,602.17	3,498,602.17		100.0
Oregon:				
Daker.....	8,654.25	8,654.25		100.0
Umatilla.....	634,387.74	414,224.00	220,163.74	65.3
Oregon-California: Klamath.....	1,265,965.72	1,230,198.66	35,767.06	97.2
South Dakota: Belle Fourche.....	698,121.11	652,427.96	45,693.15	93.5
Utah:				
Salt Lake Basin.....	216,470.59	216,470.59		100.0
Strawberry Valley.....	1,472,401.85	1,472,401.85		100.0
Washington:				
Okanogan.....	148,327.74	138,327.74	10,000.00	93.3
Yakima.....	7,391,907.11	7,058,753.61	333,153.50	95.5
Wyoming: Shoshone.....	1,053,581.70	1,053,300.64	281.06	99.9
Total.....	51,200,059.16	50,030,571.00	1,169,488.16	97.7

Statement of reclamation fund operation and maintenance charges paid and unpaid as
of June 30, 1938

State and project	Amount due	Amount re- paid	Charges due and unpaid	Percent repaid of amount due
Arizona: Yuma auxiliary.....	\$517,590.24	\$514,108.48	\$3,481.76	99.3
Arizona-California: Yuma.....	4,154,666.23	4,149,678.33	4,987.90	99.9
California: Orland.....	710,989.01	694,791.97	16,197.04	97.7
Colorado:				
Grand Valley.....	507,031.57	507,031.57		100.0
Uncompahgre.....	1,008,683.69	1,008,683.69		100.0
Idaho:				
Boise.....	2,210,352.80	2,210,352.80		100.0
King Hill.....	60,711.27	60,711.27		100.0
Minidoka.....	2,273,620.94	2,268,065.74	5,555.20	99.8
Montana:				
Huntley.....	554,787.34	554,787.34		100.0
Milk River.....	472,464.80	447,831.70	24,633.10	94.5
Sun River.....	168,718.50	168,718.50		100.0
Montana-North Dakota: Lower Yellowstone.....	338,562.56	338,562.56		100.0
Nebraska-Wyoming: North Platte.....	1,975,780.18	1,968,686.80	9,093.38	99.5
Nevada: Newlands.....	1,174,581.57	1,174,581.57		100.0
New Mexico: Carlsbad.....	1,029,055.68	1,029,055.68		100.0
New Mexico-Texas: Rio Grande.....	4,947,401.19	4,947,401.19		100.0
North Dakota:				
Buford-Trenton.....	2,317.41	2,317.41		100.0
Williston.....	34,042.75	34,042.75		100.0
Oregon:				
Umatilla.....	395,348.20	395,348.20		100.0
Vale.....	60,356.56	60,356.56		100.0
Oregon-California: Klamath.....	1,437,141.29	1,432,642.68	4,498.61	99.7
Oregon-Idaho: Owyhee.....	50,869.88	50,869.88		100.0
South Dakota: Belle Fourche.....	1,323,916.85	1,323,916.85		100.0
Utah: Strawberry Valley.....	376,880.88	376,880.88		100.0
Washington:				
Okanogan.....	371,441.72	371,441.72		100.0
Yakima.....	6,058,325.35	5,948,793.46	109,531.89	98.2
Wyoming: Shoshone.....	561,250.87	559,705.24	1,545.63	99.7
Total.....	32,776,689.33	32,597,664.82	179,024.51	99.5

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Statement of reclamation fund water-rental charges, paid and unpaid, as of June 30, 1938

State and project	Amount due	Amount repaid	Charges due and unpaid
Arizona:			
Salt River.....	\$2,246,726.01	\$2,246,726.01	-----
Yuma auxiliary.....	14,984.03	14,984.03	-----
Arizona-California: Yuma.....	576,977.03	576,484.03	\$493.00
California: Orland.....	121,489.73	121,489.73	-----
Colorado:			
Grand Valley.....	544,623.46	544,623.46	-----
Uncompaggre.....	1,234,243.85	1,222,661.96	11,581.89
Idaho:			
Boise.....	822,138.57	822,138.57	-----
Minidoka.....	855,683.58	855,614.38	69.20
Montana:			
Huntley.....	13,612.48	13,612.48	-----
Milk River.....	238,962.88	229,824.24	9,138.64
Sun River.....	132,650.90	132,069.54	587.36
Montana-North Dakota: Lower Yellowstone.....	137,647.40	136,052.78	694.62
Nebraska-Wyoming: North Platte.....	349,864.47	349,864.47	-----
Nevada: Newlands.....	28,291.16	28,291.16	-----
New Mexico:			
Carlsbad.....	40,741.28	40,741.28	-----
Hondo.....	9,129.70	9,129.70	-----
New Mexico-Texas: Rio Grande.....	1,606,872.96	1,586,116.40	20,757.56
North Dakota:			
Buford-Trenton.....	31.75	31.75	-----
Williston.....	2,117.28	2,117.28	-----
Oregon:			
Umatilla.....	102,729.77	76,452.97	26,276.80
Vale.....	21,561.55	21,358.72	202.83
Oregon-California: Klamath.....	507,214.84	502,455.59	4,759.25
Oregon-Idaho: Owyhee.....	137,686.42	127,914.39	9,772.03
South Dakota: Belle Fourche.....	11,435.74	11,435.74	-----
Utah: Strawberry Valley.....	17,596.13	17,596.13	-----
Washington:			
Okanogan.....	110,645.28	110,645.28	-----
Yakima.....	225,106.49	186,064.96	39,041.53
Wyoming:			
Riverton.....	130,806.53	130,593.57	212.96
Shoshone.....	123,528.21	123,453.31	74.90
Total.....	10,365,105.48	10,241,442.91	123,662.57

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