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THE COVER In 1892 Utah artist H. L. A. Culmer produced a series of three articles titled "Mountain Scenery of Utah" describing the beauties of lakes and streams for The Contributor. The articles were illustrated with engravings made from Culmer paintings, of which the cover illustration, "Wasatch by Moonlight," was one.
Toward a Synthetic Interpretation of the Mountain West: Diversity, Isolation, and Cooperation

BY THOMAS G. ALEXANDER
GUEST EDITOR

Since its publication in 1931, Walter Prescott Webb’s *The Great Plains* has had a tremendous impact upon assumptions underpinning the historiography of the region west of the 98th meridian. In this pioneering study, Webb argued that

A plains environment, such as that found in the western United States, presents three distinguishing characteristics:

1. It exhibits a comparatively level surface of great extent.
2. It is a treeless land, an un Forested area.
3. It is a region where rainfall is insufficient for the ordinary intensive agriculture common to lands of a humid climate.

Webb believed that any region exhibiting two of the three characteristics ought to be considered part of the Plains environment. The Mountain West was included because, according to Webb, it was treeless and arid.¹

That the third feature obtains in the Mountain West, hardly anyone would deny. But that it displays either of the other two to any consistent degree, only those unfamiliar with the region would affirm. Far from

Dr. Alexander, associate professor of history at Brigham Young University, has been a frequent contributor to the Quarterly. The editors are grateful to Dr. Alexander for his help in arranging for this special issue. The author wishes to express his appreciation for the suggestions of James B. Allen, Everett L. Cooley, S. George Ellsworth, and Charles S. Peterson.

being flat, the land is broken by mountains and plateaus. Webb’s “Inter-
Mountain Plain,” is in fact the Basin and Range Physiographic Province,
characterized by alternating basins, valleys, and mountains.  

Of greatest importance, the Mountain West was not devoid of
timber. Unlike the regions east of the 98th meridian, however, land
usually suited to general crop agriculture was not forested. Timber was
located rather on the mountains and plateaus rimming the farming
region. This circumstance caused a great deal of difficulty for early
settlers, not because the timber resources were insufficient for their needs
but because it was expensive to obtain and land disposal legislation and
administration tried to prevent the use of timber located on land which
could not be legally purchased. Because of the abundance of timber, it
is not at all surprising that the bulk of today’s national forests lie within
the Mountain States.

If then, the application of Webb’s thesis to the Mountain West fails
because two of the three characteristics are missing, what alternative
hypothesis can be used to analyze Mountain West development? Two
characteristics seem predominant: first, the region is made up of radically
diverse geographic elements; and second, the resources necessary for most
economic activities are isolated from one another.

For most generalizations about the Mountain States, one might make
almost as good a case for the opposite point of view. The region has low
precipitation, and large portions average well under eight inches per
year. In the mountains, however, are zones with more than thirty-two
inches of precipitation per year. The landscape is characterized by tree-
less valleys and by forested uplands. It exhibits both fertile, easily tilled
farmlands and rugged mountains. The rate of water runoff, unlike that
of the Great Plains, is not uniform but heavy or light depending upon
the location. It is characterized by relatively high concentrations of
mineral resources, situated at widely separated points.

The point so often made before with regard to water is also true
with regard to other resources. Timber, minerals, and farmland are all
present, but they are often concentrated in pockets isolated from one

1 Geographically, the Mountain West is approximately the region between the 105th and
120th meridians, but for convenience it will be defined as Utah, the states surrounding Utah,
America (Washington, D.C., 1970), 61-62 and 70.
Department Financial Policy in Idaho, Utah, and Arizona, 1863–1896” (Ph.D. diss., University
another. Because of the divergent location of these resources, separate pockets of settlement developed. Settlement could not follow the westward flow which had characterized the movement up to and even onto the Great Plains. Colonization of the Mountain West left vast unpopulated regions between points of high concentration of people.5

This combination of diverse geography and isolated resources has meant that a relatively high degree of cooperation or its substitute — privately or publicly supplied capital — has been necessary to bring interdependent but geographically separated resources together.6

During the early years of settlement, except where cooperation made the combination of isolated resources possible, general crop agriculture lagged behind the rest of the nation. Not until 1920, after the development of dry farming and large irrigation projects, did the percentage of the population engaged in crop agriculture in the Mountain West pass the national percentage. On the other hand, industries which could command capital for the wedding of population, resources, and technology, flourished in the region. Prime examples have been extraction of minerals, railroads, and forestry, all of which employed a disproportionately large share of the population in the nineteenth century. All of these industries tended to promote concentrated town and city rather than rural development. Even stock raising, the type of agriculture which did surpass the national average in percentage of persons employed, generally required cooperation in the distribution of range and the employment of cooperative methods which were never needed on the individualistic family farm.7

Because of these features, first, of geographic diversity, and second, of isolated resources, cooperative or corporate development has of necessity been characteristic of the Mountain West. The region between the

6 The term cooperation is used in its broadest sense to include privately as well as publicly sponsored activities.
105th and 120th meridians has more than its proportionate share of public lands, national forests, national parks, large military installations, Indian reservations, and federal reclamation projects. Even in the private sector, large corporate undertaking such as mining companies, sugar companies, and railroads have dominated the region's development.

Some years ago, Earl Pomeroy argued that historians had too often emphasized the discontinuities rather than the continuities in western development. The Mountain West exhibits both. Obviously, those who came into the region carried cultural technology baggage which they had to adapt to the new environment. It was undoubtedly this continuity of attitudes and practices which made the traditional family farm difficult and traditionally corporate undertakings like mining, railroading, and forestry possible. Some institutions such as water law had to be adapted to the new environment.

Directly in the center of the Mountain West lies Utah, which may serve as a case in point. The articles collected in this issue show the practical emphasis on collective use which was needed for the development of natural resources in Utah. By concerted community action in the construction of the Newton Project and the West Cache Canal and later by association through agencies of the federal government in the development of national forests, federal reclamation projects, and the various activities of the Civilian Conservation Corps, the people demonstrated their commitment to cooperation. In fact, the history of the development of Utah reads like a chronicle of cooperation — whether communitarian, corporate, or public — in the solution of problems caused by the peculiar environment.

For the Mormon settlers of Utah, cooperation was as much continuity as it was discontinuity for others who tried to farm in the Mountain West. Mormons had developed an ideology of cooperation within their group — if not with others — in the Midwest which made community irrigation projects possible. On many subjects, however, the ideas of the average Utahn have often remained similar to the individualistic agrarianism so characteristic of popular American culture. Perhaps an archetypical Utahn was Utah's apostle-senator, Reed Smoot.

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9 Earl S. Pomeroy, "Toward a Reorientation of Western History: Continuity and Environment," Mississippi Valley Historical Review, 41 (March 1955), 579–600.

Though he supported the Forest Service, federal reclamation projects, and national parks, his image was that of a conservative, stand-pat, Republican.\textsuperscript{11}

If the reality of Utah’s growth has been a long story of cooperative or corporate development, perhaps this realistic approach will be most important in determining whether Utahns can meet the future environmental problems. An ecological history of Utah, if the articles presented here are any indication, would probably show that within their technological and conceptual capabilities, Utahns have dealt quite well with environmental problems even though their rhetoric might not always have been consistent with their practices.\textsuperscript{12}

\textsuperscript{11}Russel B. Nye, \textit{This Almost Chosen People: Essays in the History of American Ideas} (East Lansing, 1966); Milton R. Merrill, “Reed Smoot, Apostle-Senator,” \textit{Utah Historical Quarterly}, XXVIII (October 1960), 343–49; Thomas G. Alexander, “Senator Reed Smoot and Public Land Policy, 1905–1920,” (Accepted for publication by \textit{Arizona and the West}).

\textsuperscript{12}Some of the solutions to problems in the articles below may not be the ones we would adopt today. This is not to say, however, that they were the wrong solutions for the people at that time.

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\textbf{DON'T WASTE WATER}

And the canal companies who maintain leaky canals — what of them? They would better elect new directors who will stop the leaks. It's no use saying the leaks can't be stopped. In the majority of cases it is not true. A lot of hustle, a few teams and men, plenty of clay, a little rock and mortar, and a few barrels of cement, and the leakage from most of our canals can be reduced to 5 per cent or less. . . .

Then there is the water grabber, who is so greedy that he begs, takes or steals, and misuses water, simply to keep it from his neighbor — to maintain his claim upon it, as he says. I have heard of the ancient, and occasionally wholesome practice of riding certain fellow citizens out of town. It would be delightfully wholesome if tried upon the greedy water-grabber, who does not know, or care to use the water right. (Dr. John A. Widtsoe in \textit{Deseret Farmer}, vol. 1, no. 1, Provo, Utah, July 14, 1904)
The “First” Irrigation Reservoir in the United States:
The Newton, Utah, Project

BY LEONARD J. ARRINGTON AND THOMAS C. ANDERSON

THE LATTER-DAY SAINTS are noted as “the first people to establish irrigation in Western America on an extensive scale.”¹ This was accomplished by systems of dams and canals which diverted mountain streams

Leonard Arrington is professor of economics and Thomas Anderson research associate in the water research laboratory at Utah State University, Logan. This article was written under a grant from the Utah State University Research Council. The writers are grateful for the suggestions of Paul T. Sant, chief, Economic Resources Branch, regional office of the Bureau of Reclamation, Salt Lake City; and the late Dr. O. W. Israelsen, emeritus professor of irrigation and drainage engineering, Utah State University.

¹ George Thomas, The Development of Institutions Under Irrigation, With Special Reference to Early Utah Conditions (New York, 1920), 13–14.
to irrigate cultivated crops. It was not until 1871 that a Mormon community (Newton, Utah) built what is possibly the first reservoir of substantial size in the United States to store water for purposes of irrigation.\textsuperscript{2} When this pioneer reservoir was enlarged in the 1940s, it was also reportedly the first project to be financed under the Case-Wheeler Act of 1940. The story of this reservoir of "firsts" may be used to illustrate some of the problems connected with the supply of irrigation water in Utah and the West.

\textbf{HISTORY AND SETTLEMENT}

Newton is an agricultural village with a population of 444 persons in 1970 — virtually all of them Latter-day Saints. It is situated in the western part of Cache Valley in northern Utah. This high mountain valley is bounded by ranges of the majestic Wasatch and was once completely covered with water of the prehistoric Lake Bonneville. Indeed, the Newton Reservoir is located on one of the terraces of this ancient lake.

Newton and its neighboring village of Clarkston (population 420) are separated from the rest of Cache Valley by some hills which create a small valley about four miles wide. The bench lands in this area are generally flat — the only abrupt change in the topography is the channel of the Clarkston Creek, which is up to 100 feet deep and a quarter of a mile wide. The surrounding area is one of rolling hills and low, ascending mountains covered with sagebrush, June grass and legumes, and scattered clusters of maples and bushes. For thousands of years grasses grew abundantly on the valley floor, providing feed for buffalo, deer, antelope, and other wild game. However, the rainfall, which averages less than sixteen inches per year, is inadequate to grow and cultivate crops regularly without irrigation.\textsuperscript{3}

Although bands of the Shoshoni Indians regularly visited the region to hunt and fish, Cache Valley derives its name from trappers who first entered the valley in 1824 to trap beaver and other fur.\textsuperscript{4} In the southern end of the valley the second rendezvous of the Rocky Mountain Fur Company was held in 1825, and large caches of fur were made along the

\textsuperscript{2}U. S., Department of the Interior, Bureau of Reclamation, \textit{Reclamation Project Data} (Washington, D.C., 1961), 543.

\textsuperscript{3}Of course, dry farming can take place, under certain circumstances, when there is less than sixteen inches of rainfall.

banks of the Logan and Little Bear rivers. Although trappers described Cache Valley as one of the most beautiful places in the entire Rocky Mountains, it was not considered to be a likely place for settlement because of short growing seasons and killing frosts. Mormons who explored the region in 1847–48 confirmed this view and recommended its use for grazing livestock.

At the direction of Brigham Young, Peter Maughan led the first group of settlers into Cache Valley in 1856, where they established Maughan’s Fort, later Wellsville. The northwestern part of the valley, including Newton and Clarkston, was not settled immediately because of the Indians’ refusal to surrender this part of their hunting grounds. There were also the difficulties of crossing the Bear River and of getting water to the land. A site was chosen and laid out for Clarkston in 1864. Using a method typical of most Mormon colonies, the community was settled fort-style, as a group rather than individually. In the fall of 1864 dugouts and log cabins were constructed, and twelve families stayed for the winter. Additional settlers came the following spring.

These families, which are allotted five- and ten-acre plots of farm land, had a very difficult time the first few years. The first spring many of the crops were killed by frost, and some of the cattle died from eating poisonous weeds. In 1866 the Shoshonis were so troublesome that the people moved to the larger settlement of Smithfield. Many hours were spent that summer in traveling the thirteen miles from Smithfield to Clarkston to look after the crops. Clarkston was resettled in the fall of 1867, and the people built their homes so as to create a fort for protection. The fort was built on low ground which flooded in the spring, causing sickness and disease. The village was later moved farther west to higher ground. Because of periodic drouth and visitations by grasshoppers, Clarkston residents were never able to produce a crop surplus. After some experimentation in the 1870s, each family was allotted a twenty-acre plot of dry farm land on which, with proper farming practices, wheat and alfalfa could be grown without irrigation. In this way, Clarkston came to be noted as the granary and dairyland of Cache Valley.  

Clarkston has always been and is today a place of long winters with deep snow. Many of the Clarkston settlers looked farther down the “Clarkston creek onto a sunny gentle slope which commands a view of

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the entire southern part of Cache Valley.”

Here grass was growing on the bare hills while more than two feet of snow remained at the Clarkston fort. Under the direction of their bishop and fellow farmer, William F. Rigby, a meeting was held at the newly proposed town site on February 28, 1869. By a vote of twenty-nine to three, they decided to abandon the Clarkston fort and establish a new town on the southern location.

New Town was laid out by the county surveyor, as were plots of ground to be divided among the residents for farming. The head of each family received five acres of land in the north field, ten in the south field, and five acres of meadow along the Bear River. A few families were established and lived there the winter of 1869–70. Some of the people changed their minds the following spring and decided to stay in Clarkston. Others who moved to Newton later returned to Clarkston. There was some disputation among the people as to where the town should be located. When Brigham Young visited the region in the summer of 1870, he advised that both Clarkston and the new site should be occupied. It was at that time that the name of Newton was adopted.

**THE PIONEER RESERVOIR**

One problem that arose with the separation of the people into two groups was the apportionment of the rights to the waters of Clarkston Creek. Only one-fourth of the water rights belonged to residents of Newton, and this proved to be quite insufficient for purposes of irrigation. Moreover, the small stream which left Clarkston Creek had seven miles to travel; with the seepage and evaporation enroute, little water reached the fields of Newton. Indeed, in the first year after settlement (1870), before the summer was well advanced, the small stream dissipated before reaching town. With no gardens or orchards and almost complete crop failure, the people were poorly prepared for the long winter ahead. Many planned to move away. In order to survive the winter and to have seed for the coming spring, the residents of Newton borrowed 600 bushels of wheat. So scarce was food in the region that they were required to pay one peck per bushel as interest and to give as security a first mortgage on the whole Newton south field. The new settlers were not able to pay off this mortgage for four years.

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One possible source of new irrigation water was the Bear River which was less than two miles from the town but with a bed considerably lower than the elevation of the town. An imaginative alternative was the construction of a reservoir north of the town to store the heavy spring runoff into Clarkston Creek for use during the dry summer season. At a public meeting held in the spring of 1871, the colonists agreed to labor cooperatively to build such a storage facility. A committee was appointed to work out a plan and decide on a location. About three miles north of Newton the creek made an abrupt change in direction from east to south. There was a natural depression in the topography which they thought would make an ideal site for a reservoir. Simply by placing a dam across a narrow neck on the south end of the depression, they could easily impound water for irrigation purposes.

Construction began on March 30, 1871, at which time the entire community turned out with horse- and ox-teams and scrapers. Each family was to receive water from the dam in proportion to the amount of work expended in the dam’s construction. The first dam was constructed of dirt and rocks. It washed out several times the first spring. Repairs were made on each occasion, and the participants resolved to build a more substantial structure and create a larger reservoir the second year. Enough water was stored that season to make it all worthwhile. After a permanent structure was built, they still had trouble keeping it from being washed away. Part of the face of the dam was riprapped, or walled, with rock, but the best method was to force planks into the mud and nail these to a horizontal pole which was anchored for support.

The dam was particularly threatened by a large spring thaw in 1877. To prevent it from being washed away, A. P. Welchman, one of the caretakers of the dam, dug a diversion ditch by which the water could run over grass sod rather than over the dam. Nevertheless, the dam was lost, and the incident has ever after been referred to as Welchman’s Folly. With the failure of the dam, more years of poor crops were experienced. The shrunken grain could not be marketed, and several families became discouraged and left.

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10 Hovey, “An Early History,” 110.
12 “History of Newton Reservoirs,” “Newton Ward History,” Daughters of Utah Pioneers Collection, Newton, Utah.
The colonists gradually learned some of the principles of improved dam construction, and when the dam was repaired in 1880 a wooden flume and spillway were installed to keep the dam from washing out. In 1885 the dam was raised in order to make a larger reservoir. The resulting dam was 28 feet high and 127 feet wide. It backed water up one and one-half miles, creating a reservoir with a capacity of approximately 1,570 acre-feet of water. The reservoir watered 1,660 acres.13

The canal, which had been started in 1871, was completed to the town in 1886. With the completion of the canal and enlargement of the dam, sufficient water was stored to irrigate all the lots in Newton and all the farming lands twice during the summer.14 (Usual practice today is to irrigate about eight times during a summer.) Other people in other areas had diverted streams for irrigation and to turn water wheels, and the Cottonwood Creek had been dammed to float granite blocks on rafts a distance of sixteen miles to the famous Mormon Temple in the center of Salt Lake City — a project which was unsuccessful. But this was — we are unable to find contrary evidence — the first large irrigation dam constructed in the United States to impound water for irrigation.

**NEWTON IRRIGATION COMPANY**

Originally the dam and irrigation facilities had been built and operated as a cooperative enterprise under the direction of the Mormon bishop. With the growing separation of religion and economics in Utah, forced by the Edmunds-Tucker Act of 1887,15 a secular organization was necessary. This was accomplished with the incorporation of a mutual company — the Newton Irrigation Company — on January 14, 1890. With a corporate life of fifty years, it had 10,000 shares of stock with a par value of $1.00. The market value in later years rose to $3.00 a share. The continuation of Mormon influence is reflected in the fact that the meetings of the incorporated enterprise continued to be opened and closed with prayer and most were held in the Newton chapel.16

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13 J. J. Larsen, "Reviews Struggles of Newton in Building Irrigation Dam," *The Herald Journal* (Logan, Utah), September 3, 1941; Hovey, "An Early History," 111. An acre-foot is a measurement of volume of water equal to the volume of a prism one foot high with a base one acre in area — in other words, 43,560 cubic feet.

14 "Newton Ward History."


17 J. J. Larsen, "Reviews Struggles of Newton in Building Irrigation Dam," *The Herald Journal* (Logan, Utah), September 3, 1941; Hovey, "An Early History," 111. An acre-foot is a measurement of volume of water equal to the volume of a prism one foot high with a base one acre in area — in other words, 43,560 cubic feet.

18 "Newton Ward History."


The water was distributed pro rata on the number of shares held, as were the assessments for operation and maintenance. The annual delivery was about two-tenths of an acre-foot per share, measured at the reservoir. The assessments for upkeep of the dam and canals averaged only eight cents per share because most of the work was done by the members of the company.

Thus, though the dam had been completed, along with ditches and facilities for channeling water to the fields, there were still problems and occasional washouts. A plank on the upper end of the large flume gave out in the spring of 1888. Sacks of dirt were thrown into the whirlpool created by the escaping water to try to stop it, but without avail. In 1890, the farmers started to build another reservoir at a site farther down the creek. Much dirt was placed in the creek channel, but Samuel Fortier, an engineer from the Utah State Agricultural College (now Utah State University), and a student, T. H. Humphrey (later the Utah State Engineer), suggested raising the old dam instead. This had been accomplished by 1897, raising it another three feet.  

The spillway was improved in 1899, but in winter it filled with snow and was unserviceable. The bank on the lower side of the spillway was cut, allowing the water to run over it, but this caused a wash. Spill gates were placed at the head of the spillway and a cement floor was placed below that. The spillway was later lined with cobble stones over which cement was laid. This lasted a year before it, too, washed out.

**Enter the Federal Government**

With some additional improvements the dam held for many years. By the late 1930s and early 1940s, however, it was doubtful that it would last much longer. With the growth of the population and improved methods of farming, the capacity of the pioneer reservoir was insufficient to satisfy the demands of the area. A forty-five-mile cooperative canal, the West Cache Canal, had been completed in 1905 and served the southern fields of Newton as well as a part of the rest of northwestern Cache Valley. This solved the problems in the south field, but the fields north of the town had an inadequate water supply, and many additional acres could be brought under irrigation if more water was made available.  

17 Larsen, "Reviews Struggles."  
The old dam provided less than an acre-foot per acre of land, which was less than half the quantity which would provide adequate irrigation. There was also seepage, and engineers regarded the dam as unsafe. For example, a quick thaw in the spring of 1939 would have washed out the entire structure if the farmers had not stood on the dike and broken the ice. An emergency spillway was constructed of railroad ties later that spring, but this did not satisfactorily solve the problem. Doggedly, the farmers continued to make efforts to repair, enlarge, and improve the facilities.\textsuperscript{19}

Investigations had been carried on for some time by state and private engineers. In 1938 the details of these investigations had been turned over to the United States Bureau of Reclamation which conducted further investigations in cooperation with the Utah State Engineer's office. A report of the findings was submitted to the Bureau of Reclamation and the Utah Water Storage Commission in June 1940.\textsuperscript{20}

There were several ways to increase the water storage capacity.\textsuperscript{21} The old reservoir could be strengthened and enlarged or a new reservoir could be constructed further downstream. Enlargement of the existing reservoir was favored at first, but this would have limited the capacity to 5,200 acre-feet. The Clarkston area would have received an additional 300 acre-feet more than they were getting and the Newton area an additional 2,550 acre-feet. This plan would have required the construction of an entirely new dam because of the poor condition of the old one. The new dam would be higher and would create a lake with a surface of 980 acres. Not only would this mean high maintenance and upkeep costs because of the large dam face which would be exposed to the waves, but the evaporation would be excessive, and cattails and other plants would grow in the water, entailing additional losses of water through transpiration.

Ultimately, a decision was reached to construct a new dam one and one-half miles downstream from the old one. A reservoir of 5,200 acre-feet active capacity would be created at an estimated cost of $438,000. This plan, it was decided, would "develop, within economic limits, the

\textsuperscript{19} Ibid., 17; interview with M. R. Cooley, Jr., past member of the Newton Irrigation Company, October 23, 1964.


\textsuperscript{21} Details on the proposed sites taken from U.S., Department of the Interior, Bureau of Reclamation, in cooperation with State of Utah, Utah Water Storage Commission, "Report on Newton Project, June, 1940" (MS, Logan office, Bureau of Reclamation); Bureau of Reclamation, "Report Number 47-A," 16-19.
water supply of Clarkston Creek to a greater extent, without waste of water through excessive reservoir losses, than would an enlargement of the existing reservoir." Because the new dam was further downstream, it would permit storage of the runoff from an additional 730 acres within the water basin.

With respect to financing this project, however, the farmers did not feel that they could pay—or that the dam would be worth more than—$2.50 per acre-foot of water. This would result in payment of about $7.50 per acre for sufficient water for a year. When Bureau of Reclamation representatives met with the New Reservoir Committee of the Newton Irrigation Company on July 25, 1940, they proposed a plan for the construction of a new dam under which the required $438,000 would be loaned by federal agencies, to be repaid by the farmers over a forty-year period with no interest. The annual payments were more than the farmers felt they could afford, and it appeared that the project would not go through.

Within three months, however, initiation of work on the project was assured. On October 17, 1940, President Franklin Roosevelt approved a report by Acting Secretary of the Interior A. J. Wirtz, finding the Newton project feasible for construction under the Water Conservation and

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View of Newton Dam showing rock riprap and the 300-acre lake the dam has created.
Utilization Act of August 11, 1939, as amended (commonly referred to as the Case-Wheeler Act). Under this act, projects such as Newton could be constructed by the secretary of the interior using funds directly appropriated for the act, as well as funds, labor, materials, etc., supplied by other federal agencies, such as the Works Progress Administration, Civilian Conservation Corps, and the Department of Agriculture, and also by state and local agencies. The real advantage of the act was that not all of the cost of constructing the project had to be repaid. Benefiting farmers were required to repay only to the extent of a determined ability. The amount not repaid on this basis was declared nonreimbursable and became part of the cost of programs designed to provide labor for the unemployed.\textsuperscript{24} The major obstacle to the Newton project — that of repayment — was thus cleared away and the stage set for the construction of the first project under the Case-Wheeler Act. It replaced, as we have mentioned, the first sizeable irrigation reservoir in the nation.

The Case-Wheeler Act required that a repayment contract had to be executed before water from the project could be delivered. Adhering to general reclamation law and policy, the Bureau of Reclamation required that the execution on behalf of the water user be by an organization legally formed with certain powers and authority. Thus, on May 12, 1941, the Newton Irrigation Company was reincorporated, under the laws of Utah, as the Newton Water Users Association. The new organization, with its 100-year charter, was granted all water rights and property owned by the old company. A quit-claim deed was issued for the stock in the old company, which was purchased for $5 per share and applied as credit toward the purchase of stock in the new company. The new company was empowered to issue 6,000 shares of stock with no par value.\textsuperscript{25}

The powers of the corporation were vested in an elected board of directors which consisted of seven men who chose the officers, fixed compensations, levied assessments, and were empowered to pay the assessment and direct the sale of stock or property mortgaged as security for payment in the event of a default.

As with the old company, the water was to be distributed and assessments made pro rata each share of stock. One share of stock in the com-

\textsuperscript{24} Bureau of Reclamation, "Project History, 1941," 27–28.
\textsuperscript{25} Bureau of Reclamation, "Report No. 47-A," 13; personal interview with M. R. Cooley, Jr.; Newton Water Users Association, "Minutes," August 29 and December 30, 1941. The Newton Irrigation Company had been organized January 14, 1890, for a period of fifty years, and was thus ended in 1940. The stockholders continued to meet and the group continued to function until the water users association was formed.
pany was to be worth 1.2 acre-feet of water, as there were 6,000 shares of stock and, hopefully, 7,200 acre-feet of water to be delivered each year. The corporation found it difficult to sell subscriptions to all the shares. An offer of 250 shares was made to Clarkston farmers, but they decided not to buy, although with the purchase of enough stock they could have used all the direct stream flow (the stored water, of course, was downstream) in the summer rather than let Newton have one-fourth of it. The Newton Town Corporation bought 360 shares of the stock, which gave them one-fourth interest in the Big Birch and Little Birch Springs above Clarkston, about one-half second-feet the year around. In later years this gave the town free access to the waters from these springs for culinary purposes.\footnote{The amount of stock was lowered to 5,000 shares and all were subscribed shortly. Some thought the company would go broke, and if they would but wait a few years they could buy the stock at a lower price. This did not happen. At the time of this writing the shares are valued at upwards of $30 each.}

The total estimated cost of the project was $618,000, of which $223,000 was expected to be obtained from the appropriation under the Case-Wheeler Act and the balance through work accomplished by the WPA, or the CCC, or both. The water users were to repay $350,000 of the total cost in forty equal annual installments. The contract with the United States government for the construction of the project and its repayment was signed by the board of directors of the Newton Water Users Association on August 29, 1941.\footnote{The total estimated cost of the project was $618,000, of which $223,000 was expected to be obtained from the appropriation under the Case-Wheeler Act and the balance through work accomplished by the WPA, or the CCC, or both. The water users were to repay $350,000 of the total cost in forty equal annual installments. The contract with the United States government for the construction of the project and its repayment was signed by the board of directors of the Newton Water Users Association on August 29, 1941.}

**Construction of the New Dam and Reservoir**

As proposed by the Bureau of Reclamation in 1941, the Newton Project included the following structures:\footnote{Bureau of Reclamation, “Project History, 1941,” 51–52.}

1. A dam 90 feet high, consisting of clay, sand, and gravel rolled in six-inch layers and faced with rock. The crest length of the dam to be approximately 1200 feet, of which 600 feet would be across the Clarkston Creek channel, and the other 600 to “blanket” the right side. In addition to the dam a 2,100-foot dike would be placed across the right abutment, with an emergency spillway 1000 feet long. This dike would range up to 15 feet high.
2. A reinforced concrete conduit outlet structure to be placed along the foundation of the dam, so constructed that 25 feet or more of dead storage water would be maintained in the reservoir at all times.

3. A canal starting at the end of the concrete outlet works having a length of approximately 4,000 feet and a carrying capacity of 18 second-feet.

4. A rock masonry parapet wall and a pole curb wall along the top of the dam.

Construction of the dam actually commenced on August 28, 1941. The Works Progress Administration furnished the laborers and their supervisors, and Bureau of Reclamation engineers and employees directed how and in what order the work was to be done. During the first year the construction camp — including a field laboratory building; a metal building to house machine, carpenter, and blacksmith shops, and a storehouse; and other facilities for the storage of lubricants and fuels — was completed. The dam was nearly stripped and a diversion canal for the creek almost completed by the end of 1941.\(^{29}\)

Because the project was makework in character, construction continued through the winter months, principally with WPA laborers. The winter was so cold and severe that it was necessary to heat the ground, the materials, and the forms before concrete could be laid. After the concrete was laid the structure was heated until it was cured, a process which required many days.\(^{30}\)

During the summer of 1942 the stripping was completed except for the creek, as was the temporary diversion canal. All the concrete was laid for the outlet works with the exception of the gate chamber or shaft that was to rise to the top of the dam. This was to be constructed as the height of the dam was increased. Another consideration affecting construction was the possibility that the old dam would give way. An attempt was made to construct the new dam in a way that it would not be damaged too much if this happened. As there was fear that the old dam would not hold much longer, there was some urgency in getting the new one completed.

In the meantime, however, Pearl Harbor had been bombed, causing the nation to be placed on an all-out war footing. This, of course, resolved the problems of depression and unemployment, and the WPA suspended operations on the Newton Project on November 30, 1942. Fortunately, this action had little effect, as there were only four WPA


\(^{30}\) Bureau of Reclamation, "Project History, 1942."
workers employed at the time of the suspension. As anticipated, the War Production Board also issued a stop order on December 24, ordering all work halted on the Newton Project. The only work done at the project after the stop order was maintenance and necessary repair to equipment and property.

Upon the completion of a number of defense projects in Utah in 1943, information was received that the Newton Project would be re-opened in the early fall of that year. The hope was that the project would be completed soon enough to add materially to the production of food. Construction resumed on a small scale on August 17, pending official notice from the War Production Board, which was issued on September 16 and received at the project on September 20.31

During the fall of 1943, approximately 15,000 cubic yards of earth embankment was placed in the dam foundation and the rock riprap or facing (hauled from mountains six miles away) was placed on this completed portion. In addition, a channel was excavated from the end of the outlet works to the Clarkston Creek, and concrete was laid for this structure and for the gate chamber.

Early in 1944 the creek was diverted through the outlet works, and a cofferdam (a watertight structure built to hold the water out so that work can be accomplished) was built. The creek channel was stripped of all topsoil containing roots in order that the new dam could form an impervious bond to the ground and that there would be no leakage. This permitted the actual laying of the dam. Almost all of the earth embankment and the rock riprap was placed during the summer of 1944. The earth was laid in six- to twelve-inch layers, sprayed with water, and rolled with sheepsfoot rollers to make it tight and impervious. Work commenced on the rock masonry parapet wall, and work was also started on the siphon across the old creek channel to the main canal.32

Work on the project in 1945 proceeded slowly because of the labor shortage and manpower ceiling. During the year the parapet walls were completed, as was most of the laying of the riprap. A highway was built across the dam; and the country road, which previously went over the old dam, was relocated to cross the new dam and run north. At the end of the year, eighty-five percent of the canal construction and rehabilitation was also completed. Some 1,560 acres of land were irrigated by project water that year.33

33 Bureau of Reclamation, “Project History, 1945.”
In April and May 1946 workmen completed the riprap, canals, flumes, and rehabilitation of the canals. The project was officially completed on June 15, 1946, making possible the irrigation of 2,225 acres under the new reservoir and canals.

The first 4,000 feet of canal was constructed by the government under the original project construction contract. This included two siphons across the creek bed, one just below the dam and the other almost a mile downstream. From this point the water was divided and went to the west fields in the highline canal and to the fields east of Newton by another canal on the opposite side of the creek bed. At the time of the construction contract, the canals from this point to the fields were to be constructed by the water users with the help of government agencies such as the CCC and the WPA. Since these agencies had been discontinued, the Bureau of Reclamation agreed to construct the two canals: a six-mile highline canal to the west fields and another two-mile canal to the east fields. The diversion dam in the Clarkston Creek, which had been used under the old reservoir to serve the fields at the lower elevations and the town of Newton, was also repaired. Some ten miles of laterals from the main canals to the fields were constructed by the local farmers.

As stated, the cost of the Newton Project was originally estimated at $438,000. But with the increase in prices, the addition of a concrete spillway and the canals, the actual cost was considerably more. Also, the cheap labor of those being assisted by the Works Progress Administration was not used for the whole structure, as had been originally planned. The construction costs of the project are summarized as follows:

<table>
<thead>
<tr>
<th>Storage System</th>
<th>$622,249</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land and land rights</td>
<td>$ 28,567</td>
</tr>
<tr>
<td>Relocations</td>
<td>3,611</td>
</tr>
<tr>
<td>Clearing</td>
<td>3,057</td>
</tr>
<tr>
<td>Dam and spillway</td>
<td>585,225</td>
</tr>
<tr>
<td>Structures and improvements</td>
<td>1,789</td>
</tr>
<tr>
<td>Total, Newton Project</td>
<td>$712,592</td>
</tr>
<tr>
<td>Canal System</td>
<td>$ 90,343</td>
</tr>
<tr>
<td>Land and land rights</td>
<td>1,049</td>
</tr>
<tr>
<td>Relocations</td>
<td>8,218</td>
</tr>
<tr>
<td>Clearing</td>
<td>173</td>
</tr>
<tr>
<td>Waterways</td>
<td>31,044</td>
</tr>
<tr>
<td>Structures</td>
<td>49,859</td>
</tr>
</tbody>
</table>

*U.S., Department of the Interior, Bureau of Reclamation, "Project Financial Statement, June 30, 1965," (MS, Bureau of Reclamation, Salt Lake City). This includes, of course, various costs subsequent to the initial completion.
Sprinklers evenly distribute Newton Project water on sugar beets. Grains and hay are other major field crops.

Upon receiving official notice on November 1, 1945, that the project was completed and water would be made available from the new facility in 1946, the Newton Water Users Association was allowed a two-year development period without payments, so construction charge installments commenced December 31, 1948. The contract called for the repayment of the $350,000 in forty equal payments of $8,750 each, the final payment to be made in 1988.36

On May 28, 1964, Congress passed a bill sponsored by Utah’s Senator Frank E. Moss which extended the repayment period. Apprized that the water users were not getting the benefits of the project originally expected because of the relatively dry years since 1948, Congress permitted the payments to be based on the amount of water available rather than a fixed yearly rate. A contract amending the August 29, 1941, repayment contract and effecting the variable payment plan was made effective December 31, 1963. The full $350,000 will be repaid but over a longer period of time. All scheduled payments have been met through 1970, but the water available in recent years has varied to the point that farmer income and the ability to meet installments has been impaired.37

Benefits of the Newton Project

In its present form, the Newton Dam is an earthfill structure, 101 feet high, with a volume of 410,000 cubic yards. The reservoir has a capacity of 5,600 acre-feet and stores water for the irrigation of more than 2,000 acres of land. Operation and maintenance of the project works were transferred to the Newton Water Users Association on January 1, 1948. *

When the reservoir is full, it creates a lake with a surface area of almost 300 acres, providing excellent facilities for boating and water skiing. Originally the reservoir was stocked with rainbow and German brown trout; but, because of the small amount of water flowing through in recent years, trout no longer thrive. When the contemplated Bear River Project is approved and completed — perhaps a few years in the future — sufficient water will be kept in the reservoir to maintain fish and to make possible better boating and swimming.

The following table summarizes the benefits received from the Newton Project. For the years from 1948 to 1970, an average of 4,115 acre-feet per year left the reservoir. Approximately eighty-one percent of this, or 3,340 acre-feet, reached the fields, irrigating an average of 2,049 acres. This was about 1.6 acre-feet per acre each season. The annual payment of $8,750 during this period resulted in costs of $2.50 an acre-foot. The returns from this water (and other productive factors) have resulted in an average gross crop value of $131,830, or $66.64 an acre, including government subsidies.

Many farmers have made use of rainmakers or sprinklers to irrigate their ground. This makes better use of the available water by evenly distributing the water and preventing waste. Gravity pressure systems have been cooperatively installed by groups of local farmers, thus eliminating open ditches and the expense of pumping water. This has helped to compensate for the inadequate supply of water.

The chief benefits of the Newton Project have been: (1) The stabilization of a small agricultural district by providing water to assure the maturation of sugar beets, grains, hay, and other crops; and (2) the enjoyment derived by the many visitors who have used the reservoir for recreation. While it is difficult to measure these benefits in dollars, they are nevertheless real benefits. Without the project, the population in the immediate area would undoubtedly be only a fraction of what it is today.

* Information on the completed facility from Bureau of Reclamation, Reclamation Project Data, 543–545.
The Newton Project

In the years since 1946 this Mormon valley, with fewer than 500 persons in the single town of Newton, has distinguished itself by the quality of its human product. More than ninety percent of its youth has graduated from high school, and almost forty percent of those went on to receive degrees from colleges and universities. Almost fifty percent of those receiving bachelors degrees went on for advanced degrees, and most of those now have doctoral degrees.\(^{39}\)

**BENEFITS OF THE NEWTON RECLAMATION PROJECT\(^{40}\)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Acre Feet to Fields</th>
<th>Acres Irrigated</th>
<th>Gross Crop Value</th>
<th>Acre Feet Per Acre</th>
<th>Average Revenue Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945</td>
<td>1,346</td>
<td>1,346</td>
<td>$62,131</td>
<td>—</td>
<td>$46.16</td>
</tr>
<tr>
<td>1946</td>
<td>1,948</td>
<td>2,035</td>
<td>119,223</td>
<td>2.24</td>
<td>61.20</td>
</tr>
<tr>
<td>1947</td>
<td>1,836</td>
<td>2,020</td>
<td>131,138</td>
<td>2.56</td>
<td>64.73</td>
</tr>
<tr>
<td>1948</td>
<td>4,564</td>
<td>1,872</td>
<td>124,922</td>
<td>2.74</td>
<td>66.73</td>
</tr>
<tr>
<td>1949</td>
<td>5,169</td>
<td>1,766</td>
<td>142,971</td>
<td>2.41</td>
<td>80.96</td>
</tr>
<tr>
<td>1950</td>
<td>5,153</td>
<td>1,766</td>
<td>130,133</td>
<td>1.51</td>
<td>68.74</td>
</tr>
<tr>
<td>1951</td>
<td>4,727</td>
<td>1,893</td>
<td>130,133</td>
<td>1.51</td>
<td>68.74</td>
</tr>
<tr>
<td>1952</td>
<td>2,630</td>
<td>1,918</td>
<td>124,257</td>
<td>2.35</td>
<td>64.78</td>
</tr>
<tr>
<td>1953</td>
<td>4,462</td>
<td>1,969</td>
<td>111,235</td>
<td>1.92</td>
<td>56.49</td>
</tr>
<tr>
<td>1954</td>
<td>3,772</td>
<td>2,030</td>
<td>106,265</td>
<td>1.70</td>
<td>56.70</td>
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<tr>
<td>1955</td>
<td>3,341</td>
<td>2,030</td>
<td>122,469</td>
<td>1.54</td>
<td>60.33</td>
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<tr>
<td>1956</td>
<td>3,248</td>
<td>2,194</td>
<td>149,783</td>
<td>1.24</td>
<td>68.27</td>
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<tr>
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<td>2,127</td>
<td>132,982</td>
<td>1.59</td>
<td>62.52</td>
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<td>1958</td>
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<td>2,108</td>
<td>139,814</td>
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<tr>
<td>1959</td>
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<td>117,996</td>
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<tr>
<td>1960</td>
<td>1,691</td>
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<td>94,390</td>
<td>.80</td>
<td>46.02</td>
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<tr>
<td>1961</td>
<td>3,357</td>
<td>2,116</td>
<td>137,751</td>
<td>1.54</td>
<td>65.10</td>
</tr>
<tr>
<td>1962</td>
<td>2,537</td>
<td>2,101</td>
<td>141,516</td>
<td>1.18</td>
<td>67.36</td>
</tr>
<tr>
<td>1963</td>
<td>2,638</td>
<td>2,025</td>
<td>128,914</td>
<td>1.30</td>
<td>63.66</td>
</tr>
<tr>
<td>1964</td>
<td>3,171</td>
<td>2,195</td>
<td>166,458</td>
<td>1.44</td>
<td>75.84</td>
</tr>
<tr>
<td>1965</td>
<td>3,631</td>
<td>2,266</td>
<td>187,949</td>
<td>1.60</td>
<td>82.94</td>
</tr>
<tr>
<td>1966</td>
<td>2,705</td>
<td>2,498</td>
<td>199,036</td>
<td>1.08</td>
<td>79.67</td>
</tr>
<tr>
<td>1967</td>
<td>2,251</td>
<td>2,247</td>
<td>185,147</td>
<td>1.00</td>
<td>82.40</td>
</tr>
<tr>
<td>1968</td>
<td>3,400</td>
<td>2,434</td>
<td>211,210</td>
<td>1.40</td>
<td>86.77</td>
</tr>
<tr>
<td>1969</td>
<td>3,066</td>
<td>2,346</td>
<td>—</td>
<td>1.31</td>
<td>—</td>
</tr>
</tbody>
</table>

\(^{39}\) It is also a curiosity that the village of Newton reared Utah's only candidate for the Presidency of the United States: Parley Packer Christensen, a lawyer, who ran (unsuccessfully) on the Farm-Labor ticket in 1920. Gaylon L. Caldwell, "Utah's First Presidential Candidate," *Utah Historical Quarterly*, 28 (October 1960), 327-341.

\(^{40}\) Compiled from project files in the Bureau of Reclamation, Logan, Utah, office. In 1945-47 crops were irrigated with water from the pioneer reservoir.
Water for the Big Range

BY A. J. SIMMONDS

Geography has generally favored the agricultural settlement of Cache Valley. Numerous streams, easily diverted for irrigation purposes, flow from the surrounding mountains to the Bear River which bisects the valley floor. But there is one section of Cache Valley which is not so

Mr. Simmonds is special collections librarian at Utah State University. This paper was first written in 1965 as partial fulfillment of the requirements for a course in economic history given by Professor Leonard J. Arrington. The author wishes to express thanks to Leland Cottle of Trenton, general manager of the West Cache Irrigation Company, for permission to use the records of the company.
favored — the area known in early pioneer times as the Big Range, which today embraces the villages of Cornish, Trenton, and Amalga. This area lies along the west bank of Bear River but is situated on bluffs a hundred feet above its wide, meandering channel. On the west, the few creeks which flow from the high mountains west of Clarkston are diverted to the south (and into the Newton Reservoir) by an outrider range of foothills — too low to hold a large water supply. Thus, although Mormon colonization was typically accomplished by means of compact villages on streams large enough to provide irrigation water for the surrounding fields, the difficulty of diverting the Bear River to the Big Range meant that this area had to follow a different course of development from its Cache Valley neighbors.

By 1870 Mormon settlement with its concomitant village-irrigation orientation had circled Cache Valley. Along the base of the mountains, a dozen communities had come into existence, with the Big Range alone remaining uninhabited.¹

SETTLEMENT OF THE BIG RANGE

As irrigation pushed settlement out from the first centers, the Cornish-Trenton area became used extensively as a herd ground for cattle from the older communities. Its lush grass, small springs, and lack of population proved especially attractive. It was grazed by town herds under the supervision of a community herdsman and by the herds of six or eight private owners who had more than a hundred head each. It was because of grazing that Trenton, the mother community of the Big Range villages, was settled — the only Cache town to have this as the principal impetus for settlement.²

The first permanent settlers of the Big Range, who began to arrive in the years following 1870, established ranches on the few springs in the western foothills or along the Bear River. There they ranged their own cattle as well as those from the private and town herds. Many of the Cache towns hired one of the settlers to herd their cattle, thus replacing the venerable institution of the community herdsman. An increasing number of settlers established themselves on the Big Range after the area was surveyed in 1876 by Deputy U. S. Surveyor A. J. Stewart and was

² For a fuller discussion of the area and the sources on which it is based, see: A. J. Simmonds, On The Big Range: A Centennial History of Cornish and Trenton, Cache County, Utah (Logan, 1970).
thrown open to settlement under the terms of the Homestead Act. However, the settlers remained largely stock raisers out of the sheer necessity imposed on them by this arid region.

Nevertheless, from the very beginning of settlement on the Big Range, the ultimate goal of the landowners was the irrigation type of agriculture common to other valley communities. Of the 208 residents of Trenton precinct in 1880, 145 were born in Utah; and at least 40 more had grown to maturity in the territory. They were products of the institutions and culture of a society based on irrigation and did not expect to continue indefinitely in a ranching, dry-farming economy.

The first attempt at irrigation was made in 1872 when the South Field Ditch was dug south from Weston Creek as one of five canals irrigating the fields around Weston, Idaho. The ditch extended a mile and a half into Utah and irrigated about 170 acres for farmers on part of the Big Range.

In 1877 Congress passed the Desert Lands Act. Under the provisions of this legislation, a person could buy up to 640 acres of the public domain for $1.25 per acre if the land could be irrigated within three years. Abuses under this act were common throughout the arid west, and Trenton was no exception.

To take advantage of the act, in 1880 many Trenton residents and outsiders eager to gain title to more land incorporated the Weston South Field Irrigating Company and filed on as much water "as can be conducted through a ditch which is ten (10) feet wide at the top; six (6) feet wide at the bottom, three (3) feet deep with a fall of one and one half (1\(\frac{1}{2}\)) inches to the rod."

Though Weston farmers had been using water from Weston Creek since 1865, they had neglected to record such use under Idaho law. The appropriation by the South Field Irrigating Company included virtually all the creek's stream-flow.

During late 1880 and early 1881 the length of the canal was actually increased by almost four miles. While the circuitous line was surveyed (probably by Edward Hanson) to take advantage of the topography, sec-

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3 Tenth Census of the United States (1880), Utah, 1:228–30, Trenton Precinct.
4 A discussion of the cultural patterns developed by Utahns under irrigation agriculture is found in George Thomas, The Development of Institutions Under Irrigation, With Special Reference to Early Utah Conditions (New York, 1920).
6 Benjamin Horace Hibbard, A History of the Public Land Policies (New York, 1939), 426–27
7 Oneida County Miscellaneous Record "A," 105 (MS, County Clerk's vault, Oneida County Courthouse, Malad City, Idaho).
tions of the line required an extensive system of levees and fills which were laboriously built with slip-scrapers and wooden slides, the Mormon scraper and go devil of colloquial parlance.

From data furnished in 1889 to the Special Committee of the United States Senate on the Irrigation and Reclamation of Arid Lands, the enlarged South Field Ditch, or Trenton Canal, as it came to be called, was projected to irrigate 5,000 acres. Built from a mile south of the Idaho line to Ransom Hollow near the present site of Trenton, the canal actually carried water during 1881.8

That year witnessed a prolonged battle in district court. An injunction was placed on all canals but the South Field Ditch while arguments were heard in Malad City over Weston Creek water rights. In 1882 the lengthy suit was concluded when the court held that each man possessed the water rights noted since 1867 in the books of the Weston Creek Watermaster.9

The decision dashed the hopes of the South Field Ditch promoters to secure irrigation water for Trenton from Weston Creek, but many of them did secure land under terms of the Desert Lands Act. In all 880 acres were so patented.10

While the South Field Ditch was extended for the main purpose of securing title to the land, other plans were advanced to bring water in sufficient quantity for irrigation. In 1876 the Goodwin Brothers, largest ranchers on the Big Range, hired Edward Hanson of Logan to survey a possible canal route.11 Mr. Hanson ran a survey up Bear River for twenty miles, the distance necessary to bring water out of the river bottoms onto the Trenton flats. However, Trenton was too sparsely populated in 1876 and the cost seemed too great when spread among the few families.

Various other plans were proposed. Artesian wells were dug in almost every quarter-section, but with the noticeable exception of the

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9 Lars Fredrickson, “Chronological History of Weston, Idaho,” (MS, Special Collections, USU), 1881–1882. I have carefully examined the court records in the vault of the Clerk of Oneida County, but the transcripts of cases before about 1905 have disappeared.
10 Cache County Recorder, Deed Books “L,” 274; “I,” 339; “2,” 167, 344; “V,” 1; “11,” 233. It is perhaps significant that 660 of the acres patented under Desert Land entries were entered by non-Mormons.
11 Charles Isaac, William, James, Frederick, and George Goodwin were Logan merchants who had moved to the Big Range after pressure from the “Cooperative Movement” had forced them to consolidate with the Logan Cooperative Mercantile Institution. See “Joel E. Ricks Notes,” interview with Frank Wood (microfilm in Utah State Historical Society Library, Salt Lake City).
Goodwin Brothers’ well, the water was poor and not in sufficient quantity for irrigation. During the late 1880s and the early 1890s, two reservoir sites—one on Weston Creek and one on Clarkston Creek—were considered. Because of the cost and the limited amount of water, both proposals were dropped.

Once the Goodwin Brothers survey had demonstrated the practicality of tapping Bear River, whatever other plans were temporarily advanced, the Bear remained the lode-stone of irrigation plans. In late 1881 a Trenton correspondent for the Logan Leader noted that “When the water comes from Bear River, which it will do in the near future, this will be one of the best locations in the mountains.” In 1889, O. J. Hollister, secretary of the Salt Lake City Chamber of Commerce, testified before a Senate committee on irrigation and reclamation that the Trenton area could be irrigated from Bear River with the use of Bear Lake as a reservoir to assure a stable stream flow.\(^\text{12}\)

Aside from purely physical and financial reasons, another impediment to early development of irrigation in Trenton was the large number of non-Mormons — more than forty percent, according to the 1891 school census. Even as late as 1900, Assistant LDS Church Historian Andrew Jenson estimated that one half of the Trenton area was non-Mormon.\(^\text{13}\) Unlike the Gentile population in the cities, these were farmers. As with their city cohorts, however, they were opposed to Mormon domination. “Ecclesiastical control over irrigation was effective only while the church was the sole authority and the people were of one

\(^{12}\) Logan Leader, December 23, 1881; Senate Report 928, 2:41-47.

\(^{13}\) The Edmunds-Tucker Act of 1887 required Utah school districts to list the religion of the parents of all school children in the district. It is interesting to note that West Cache is one of the few farming areas in territorial Utah in which a substantial proportion of the people were non-Mormons. Gentiles were numerous in the cities and mining districts, but were rare among the agricultural population of the territory. Trenton District Minute Book, Census of 1891 (Special Collections, USU); MS History of Trenton Ward (LDS Church Historian’s Office, Salt Lake City), 2.
faith."  

Clearly, the old cooperative methods which had characterized early irrigation in Cache Valley would not serve the Trenton area. A more secular organization would be needed.

**GENESIS OF THE WEST CACHE CANAL**

In February 1894 Charles G. Wood, the school teacher and a recent graduate of Amherst College, called a meeting at the Red Brick school house in Trenton to consider any and all possibilities of obtaining irrigation water for the area. Wood was elected chairman of a standing committee of seven to investigate promising sites. The people of Trenton and the Silver Star district of southern Weston subscribed $1.00 per farm, and Professor Samuel Fortier of the Agricultural College at Logan ran a reconnaissance survey far enough up the Bear River to study the irrigation of the two districts. He recommended against construction of a canal — largely because of the prohibitive cost of $180,000.

Two years later, a meeting was held at Weston to consider Mink Creek as a source of supply for Clifton, Dayton, Weston (in Idaho), and Trenton. The farmers paid J. H. Holiday to make a survey, "but it was feared there was not enough water for all."

Despite these setbacks, interest in a canal did not lag — especially the interest of Charles G. Wood, who may rightly be considered as the father of the West Cache. Early in 1898 he talked with Edward Hanson who had conducted the 1876 survey for the Goodwin Brothers. Hanson reported the route favorable and estimated the probably cost at $50,000, mostly in labor. Money was again collected and a new route, ten feet higher than the original, was surveyed during March 1898. A meeting was called at the Red Brick and the report of the survey was submitted to the farmers of Trenton, Alto (Amalga), and Newton. Bear River held an ample supply of water, and the cost did not seem prohibitive.

In order to build and manage the canal, it was agreed at the March meeting to incorporate a company with 10,000 shares at a par value of $10.00 per share. An interim board of directors was chosen. M. W.
Red Brick School, Trenton, site of meetings of the West Cache Irrigation Company, was demolished in 1963. Courtesy Special Collections, Utah State University.

Butler was elected president of the board with Parley Merrill, George W. Adams, William Bingham, and Joseph Wood as directors. C. G. Wood was elected secretary-treasurer.

The Secretary was instructed to consult Attorney W. W. Maughan and have Articles of Incorporation and By-laws drawn up; and the President and Secretary instructed to canvass the district for stock subscriptions and to collect ten percent of each subscription in cash or negotiable notes. It was decided to hire Washington Jenkins of Ogden as field engineer and A. F. Parker, also of Ogden, as consulting engineer.\(^\text{18}\)

Jenkins and Parker placed a party in the field on July 11, 1898, which re-surveyed the proposed canal route. Flumes at Battle Creek, Deep Creek, and Weston Creek were recommended to save distance and fall.\(^\text{19}\)

On September 26, 1898, at a meeting in the Red Brick, it was reported that about 2,500 shares of stock had been subscribed. The Articles of Incorporation were read and adopted, and the West Cache Irrigation Company was born. On December 17, 1898, the by-laws were adopted and the interim officers were made permanent.\(^\text{20}\)

George H. Champ of the Utah Mortgage and Loan Corporation [in Logan] agreed to lend the company $40,000 on a twenty year bond issue if the right-of-way deeds for 100 feet of ground were secured and if each contractor who worked received one-third of his pay in cash and two-thirds in stock.\(^\text{21}\)


\(^{19}\) Humphreys to Nebeker, et al.

\(^{20}\) Articles of Incorporation and By-Laws of the West Cache Irrigation Company (Logan, 1899), 15.

A final survey and cross-section of the work was ordered and the secretary began letting contracts following Champ's guidelines. On October 10, 1898, near the Idaho line, C. G. Wood turned the first scraper of dirt to begin work on the canal.

**Construction of the West Cache**

Construction work centered around three or four camps scattered along the length of the canal route. The workers lived in tents or boarded with neighboring farmers. A large cook-tent was a prominent feature of each camp, with local women hired by the company to cook for the men. Much of the work force consisted of farmers whose lands were to be served by the completed canal and who wanted to secure more stock in the company as well as extra money. The work continued all year, but it was most vigorous in the winter months when farm work (which would ordinarily occupy most of the available help) was at a minimum.\(^{22}\)

In actual construction the soil was first loosened by plowing and then taken out with slip-scrapers. A good part of the canal was dug with the aid of nothing more than a pick to loosen the frozen soil and a shovel to build up the bank.\(^{23}\)

Work continued slowly from 1898 — too slowly to please field engineer Washington Jenkins. In a letter to C. G. Wood in August 1900 he complained:

> There is altogether too much time lost in traveling up the canal from Butler's place and return to suit me, and I would like to make as near one job of that cross-section work as it is possible — and that too before the rush of graders comes on, (if it is ever coming)!\(^{24}\)

In the same letter the engineer issues a special plea that sagebrush be cleared off the land "where the bank is to be built. The brush built into the bank will decay and be sure to leave vacancies through which the water will be apt to find a way and cause a rupture."

In 1900 when the canal had been built almost to Weston, an additional bond issue of $20,000 was sold. The new funds went for headgates, flumes, bridges, railroad crossings, and for additional construction work. Already the canal had cost more than the first estimate. In 1898, before work had actually begun, the Utah Construction Company of

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\(^{22}\) Moses Andreason, Logan, interview, March 28, 1962. Andreason was a construction worker on the canal.

\(^{23}\) Ibid.

\(^{24}\) Washington Jenkins to C. G. Wood, August 5, 1900, files of West Cache Irrigation Company, Trenton, Utah.
Ogden—equipped with steam shovels—had bid to build the West Cache for $80,000. Their offer was declined because the stockholders and management thought they could build it cheaper themselves. That refusal was to cause many a second thought before the canal was completed.25

The construction work on the north half of the canal (that part in Idaho) was a slow process because the channel had to be carved out of the bluff along the river bottoms. By late 1901, however, two of the three construction camps had moved out onto the Trenton flats where work could proceed more rapidly. By January 31, 1902, there were three camps at work: William Dopp's near the Cannon Station (the Union Pacific station which sat astride the Utah-Idaho line), B. F. Bingham's in northern Trenton, and B. Y. Benson's in southern Trenton. By May of that year the canal was completed southward to the Utah line, and in August the first water was temporarily turned into the West Cache as far south as Battle Creek.26

In May 1904, after a delay in construction caused by the Panic of 1903, the West Cache reached Trenton, and the water was turned in to wet the whole line. Some finishing work was done on the main line in 1904, mainly installation of fixtures and shoring of already completed banks. Water was turned into the main canal on March 25, 1905. As completed, it was the second largest canal in Utah—exceeded only in capacity and acres irrigated by the Bear River Canal in Box Elder County (which was partially constructed by the Utah-Idaho Sugar Company). Watering roughly one-fifth of the irrigated land in Cache Valley, the West Cache was built by a precinct which included less than a thousand people. Seven years of work had been rewarded; Trenton, Cornish, and Amalga lands were under irrigation!27

Various laterals branched off the main canal. These in turn fed the water into the smaller ditches and finally into the fields themselves. The laterals, of varying capacities, were largely built and maintained by the farmers who drew water from them, though the company held title to the land and company engineers surveyed their courses.

For the management of a canal so large as the West Cache, there was no precedent in the region; organization evolved with need. On

25 The contemporary records of the company have disappeared, but the offer and the amount are verified by various people concerned with the construction of the canal whom this writer has interviewed.
26 Jenkins to William Bingham, January 31, 1902, files of West Cache Irrigation Company. Prudence Butler, "Settlement of Trenton" (MS, May 1902, Special Collections, USU).
June 12, 1905, the board decided to hire two ditchriders who were to patrol the canal on horseback and check for possible dangerous places in the banks. Several weeks later Directors B. Y. Benson and B. F. Bingham were authorized to employ a watermaster to oversee the whole canal from the Idaho line to southern Trenton. The ten miles from the head of the canal to the Idaho line was to be handled by one of the ditchriders.28

BUILDING THE BRANCH LINES

Even with the main canal finishing, much construction remained to be done. At Trenton the West Cache divided: one branch went east and south to Alto (Amalga) and the other south and west to lower Newton. Work began simultaneously on both branches in 1905, but financial difficulties prevented completion until 1909.29

Money — or rather the lack of it — was the greatest problem which the West Cache Irrigation Company faced during its early years. The company’s files are filled with bills demanding early payment; but none equals the directness of the July 12, 1900, letter from attorney J. Z. Stewart, Jr.:

Gentlemen: —

Please send in what you are owing for sand.

We need the money.

By the time the water reached Trenton in 1905, the company had floated bonds worth $60,000. In addition, numerous loans were made at Utah Mortgage and Loan Corporation, Thatcher Brothers Bank, and other Logan institutions. By 1905 the company’s credit rating was so poor that the directors were forced to borrow $3,500 on their personal notes to meet some of the canal’s pressing financial obligations.30

Assessments of thirty, forty, or fifty cents per share were levied almost quarterly on the company’s stock, with much of this money used to pay interest on the outstanding bonds. Most of the farmers who held West Cache stock were forced to mortgage their land in order to meet the assessments. In 1906 the company paid a dividend in unissued stock equal to the amount paid in assessments in 1905 above the face value of the stock already held!31 Income was at such a low ebb that at the annual

28 Ibid.
29 Articles of Incorporation and By-Laws of the Trenton Irrigation Company (Logan, 1910), 2.
30 Minutes of the Board of Directors, vol. 1, p. 9.
31 Ibid., 25.
stockholders’ meeting on February 3, 1906, it was decided to give “any person who desires work, and who will work for stock, a contract on the construction of the Newton Branch.” 32

On June 27, 1906, the stockholders approved an additional $85,000 bond issue to the Peoples Bank and Trust Company of Rockford, Illinois, to retire old debts and to provide additional working capital for work on the Amalga and Newton branches. 33 This provided a breathing spell for the harried company. Work was pushed vigorously on the two branches, and new fixtures were installed.

With a temporary respite from fiscal worries, the company began organizing to implement its prime function of distributing water. Though from 1905 to 1910 — and even later — water was out of the canal more than half the time because of breaks and washouts, conditions kept improving. Permanent employees were hired. In 1906 C. A. Brown of Trenton agreed to serve as watermaster at $2.50 per day, and on July 13, 1907, a watermaster was employed for $75.00 per month. 34 For the year 1907 the directors ordered that water be distributed to the stockholders at the rate of five hours per share “providing that not more than one-fourth of the allotment be used at the first watering.” 35 Even these liberal rates did not prevent the temptation to use more; the directors found it necessary to provide each headgate with a lock and key. 36

With the Panic of 1907, financial crisis returned to plague the company. As the two branch lines were brought to completion, the treasury was exhausted. By 1909 the West Cache could not pay the $137 tax on its Idaho holdings, and on July 8, 1910, the Idaho section of the canal was sold to the county for tax arrears. A. H. Thompson of the Utah Mortgage and Loan Corporation, which held notes on the canal, wrote to the secretary of the company with considerable understatement: “We do not remember whether you have been paying taxes in Idaho or not, but anyway they seem to have sold your right-of-way!” 37

The continual assessments forced many farmers to sell or mortgage their capital stock. By 1910 the great majority of the $100,000 in capital stock was either owned or held in trust by twenty-five people. The

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32 Ibid.
33 Ibid., 47–51.
34 C. A. Brown to the Board of Directors, March 7, 1906, files of West Cache Irrigation Company; Minutes of the Board of Directors, vol. 1, p. 87.
35 Ibid., 84.
36 Ibid., 76.
37 A. H. Thompson, secretary-treasurer of the Utah Mortgage and Loan Corporation, to T. N. Judah, secretary, West Cache Irrigation Company, August 5, 1910, files of the West Cache Irrigation Company.
capitalization already exceeded by debts, the twenty-five owners and trustees, on December 22, 1910, reincorporated the company as the Trenton Irrigation Company, with an authorized capital of $400,000. The company’s seat of business was transferred from Trenton to Logan.  

But the Trenton Irrigation Company was short-lived. Most of the stock (and hence water rights) was held by a few men who rented the water to the farmers. Their monopoly was not only resented but was costly to those who were without water rights. Taking advantage of Utah’s liberal irrigation district laws, a movement was started to eliminate the stock company and form an irrigation district.  

The climate was favorable. The men who held the stock found it expensive to maintain their monopoly, for they had to bear the high assessments. Rather than pay exorbitant rents to the company, many farmers simply let their lands revert to a dry-land type of agriculture. Faced with an abundance of unused water and mounting costs, the principal stockholders were not adverse to a change.  

On January 6, 1912, a committee of three was elected to superintend the organization of an irrigation district, and a month later the first meeting of the board of directors of the Cache Valley Irrigation District was held — back in Trenton. The board consisted of B. F. Bingham, C. G. Wood, L. P. Peterson, M. C. Rigby, and W. H. Thain. T. H. Judah held the triple role of secretary, treasurer, and general manager at a
yearly salary of $1,350. On April 8, 1912, the residents of the Cache Valley Irrigation District voted a $40,000 bond to purchase water rights from the defunct Trenton Irrigation Company.\(^4^0\)

The objective of broad community control having been achieved and maintained, there was no longer strong incentive to continue the irrigation district, and in 1923 it was dissolved and the canal returned to a stock company under its original name, the West Cache Irrigation Company. It was capitalized at $150,000, divided into 15,000 shares.\(^4^1\)

**WEST CACHE REVIVED**

Begun in the depression of the late 'nineties and built during the Panics of 1903 and 1907, the West Cache enterprise now faced the Great Depression. Though it delayed solution, by late 1937 final payments were made. For the first time since its organization in 1898, the West Cache Irrigation Company was solvent.\(^4^2\)

But now troubles beset the individual stockholders. Considering the low farm prices, many farms were lost to mortgage holders or sold for taxes. Much stock defaulted to the company and more to the banks which held farm mortgages. On April 8, 1941, the company’s secretary noted in the minutes that stock held or being sold under contract by the Federal Land Bank at Berkeley, California, totaled 6,923 shares. Since one of the by-laws forbade proxy voting, he added:

> Therefore, for the Federal Land Bank to vote its stock, it would be necessary for either the Bank’s president or secretary to be present at the meeting to vote its stock in person.

> The problem now arises since the bank represents a majority of the stock, that if they did not come to the meeting there is a question as to whether a meeting could be held without them.\(^4^3\)

Not worrying about the niceties of Robert’s Rules, the meeting was held.

High agricultural prices during World War II brought stability to both the company and to the farmers — but there was yet another re-incorporation. After the demise of the Irrigation District in 1923, the company had been re-incorporated as a shareholding concern for a period of thirty years. By 1953, the time had expired, and another re-incorporation was necessary — this time for 99 years.\(^4^4\)

\(^4^0\) Minutes of the Board of Directors, vol. 1, pp. 165, 168; vol. 2, p. 4.
\(^4^1\) Ibid., vol. 3, p. 1.
\(^4^2\) Ibid., vol. 4, p. 8.
\(^4^3\) Minutes of the Board of Directors, vol. 4, p. 120.
\(^4^4\) Articles of Incorporation of the West Cache Canal Company, November 16, 1953 (typescript in the company’s files).
Built at a cost of $267,000, with another $250,000 spent on the line for laterals, railroad crossings, headgates, and the branch lines, the West Cache Canal takes water from both Bear River and Deep Creek. It delivers about 33,000 acre-feet of water, though the company has recorded rights to 40,000 feet. The main canal is 25.5 miles in length; the Amalga branch 10 miles; the Newton branch 8.7 miles; and the various laterals 14 miles, making a total of 58.2 miles in the whole West Cache system. Water from the canal irrigates 14,832 acres of land — approximately one-tenth of the total irrigated acreage in Cache Valley.

The company is governed by a board of five directors. By an informal agreement, there is one director from each of the five political divisions through which the canal flows: Idaho, Cornish, Trenton, Amalga, and Newton. The president of the company is elected by the board from one of their number. The actual managing of the canal is handled by the general manager from the company’s headquarters in the West Cache Building at Trenton.

Irrigating nearly 20,000 acres with a population of 1,032 persons under the canal, the West Cache makes possible the cultivation of sugar beets, barley, oats, wheat, corn, peas, beans, and alfalfa, which additionally supports the extensive dairy industry of western Cache Valley. The annual income from farm enterprises directly dependent upon the canal is in excess of $2,000,000. The contribution of the enterprise is measured by the fact that, in a very real sense, without the West Cache Canal there would be no “West Side” — no villages of Cornish, Trenton, or Amalga. The waters of the Bear, diverted through the West Cache Canal system, are truly the lifeblood of the Cache Valley West Side.

45 *Articles of Incorporation and By-Laws of the Trenton Irrigation Company*, 2. Humphreys to Nebeker, et al.

46 *Stuart H. Richards, et al., Irrigation and Canal Companies of Utah*, Utah Cooperative Extension Service Circular No. 331 (Logan, 1966), 14.
At eleven o'clock on July 1, 1902, Chief Grazing Officer Albert F. Potter of the Department of the Interior's Division of Forestry (later the Department of Agriculture's Forest Service) arrived by train in Logan,
Utah. Before sundown he had begun work on what was not only a pioneering effort in public management of natural resources in Utah but was probably the most important forest survey ever made in the state. Lasting five months and carrying Potter on a crisscross exploration through the Wasatch Mountains and Colorado Plateau from the Idaho border on the north to Escalante on the south, the survey led directly to the establishment of a series of forest reserves in Utah.

Though not the first survey made in Utah’s forested areas, it was by far the most general. Potter was primarily concerned with ecological balance, conservation, and with the relation of forest resources to the social needs of Utah’s people; and his work was unique in that it served as an administrative step in the process of creating a reserve system in Utah. In his report Potter laid the groundwork for dividing the forests into manageable units. In part, this was a matter of recognizing geographic and economic entities. In part it was an exercise in public relations, as Potter was attentive to the attitudes of the people using the forests and living adjacent to them. Nor did he neglect to preach the gospel of what his superior, Gifford Pinchot, and President Theodore Roosevelt were beginning to call conservation.

Unlike the work of John Wesley Powell, Potter’s survey did not result in the development of a grand theory of the relationship of water, land, vegetation, and people. Potter’s job was the more practical one of determining how the immediate needs of both the people and the lands could best be met. Rather than a theory of development, Potter’s was a study in practical ecology. Because of its practicality, Potter’s could be immediately implemented where Powell’s could not.¹

Potter’s 1902 visit in Utah was cast in the grand pattern of the far ranging tour which Gifford Pinchot had already made famous. Beginning in 1896 while a member of President Grover Cleveland’s Commission on Forestry, Pinchot had traveled widely in western forests. Moving rapidly through a region and touching on as many facets of forest environment as possible, Pinchot immersed himself in the forest sensing its nature and relation to the society of which it was part as well as gain-

ing some idea of its administrative needs. In the beginning, Pinchot’s concern was limited almost entirely to trees. But as time passed and his contact with western forests broadened, he came to recognize the importance of other factors. One of these was the relationship of grazing and livestock to mountain areas.²

Unlike Pinchot and so many other foresters, Potter was neither highly educated nor an easterner. Indeed, in many ways he was a westerner’s westerner. His background was that of the livestock frontier. Finding his way at an early period from California into the Little Colorado country of northern Arizona, he, like Will C. Barnes whom he later brought into the Forest Service, ran a small herd of cattle.³ His operation, which initially promised to do well, fell on hard times after 1884 when the Aztec Land and Cattle Company from Texas purchased railroad grant lands from the Atlantic and Pacific Railroad. Herded by Texas toughs, the 40,000 head of cattle belonging to the Hash Knife (as the company was locally known because of its brand) soon filled a block of land nearly one hundred miles square from Holbrook on the east to Flagstaff on the west, and south to the Tonto Basin and north to the Navajo reservation.⁴ Potter might have survived the Hash Knife but in the 1890s an extended drought killed thousands of cattle on northern Arizona’s overgrazed deserts including stock belonging to both the Hash Knife and Albert Potter.⁵

Jobbing about northern Arizona Potter held several public offices during the late 1890s and became secretary of the Eastern Division of the Arizona Woolgrowers’ Association. It was in this position that Pinchot found him in May of 1900. Since Potter was well acquainted with both grazing and northern Arizona, he was assigned to guide Pinchot along the Mogollon Rim and the White Mountains which sweep east and south from the San Francisco Mountains across Arizona to New Mexico.

Departing from the railroad town of Winslow, Potter led Pinchot south through dry hills towards the rim. This leg of the journey provided opportunity for each man to make an appraisal of the other. According to Pinchot, Potter tested his mettle early. Running out of water, the Arizona stockman hunted up "a stagnant pool of terrible green water. Sticking out of it were the horns of rotting carcasses of cattle that had waded in and drunk till they bogged down and died." Without giving further details Pinchot opined that he passed his first test in Potter’s eyes when he drank from it. On the other hand, by the end of the trip Potter had so risen in Pinchot’s esteem that he was soon made head of the branch of grazing that Pinchot came to regard as a necessary part of forest administration after the Arizona experience.

Following a pattern well established in Forest Service administration, Albert F. Potter kept a daily log from his arrival in Logan on July 1 to November 22 when heavy snows finally forced him to abandon his reconnaissance. His notes ran to fifty-eight single-spaced typed pages. The diary is, in effect, a report on Utah’s mountain resources and a most perceptive analysis of the condition of these resources after something more than a half-century’s use by Utah’s white inhabitants. Although Potter indicated his intent to make specific recommendations, his Wasatch diary did not include his recommendations as such.

His 145-day tour of Utah was notable for its extent and duration and for the urgency with which he proceeded. He worked 122 days in the field — twenty-two days in July, twenty-nine in August, twenty-one in September, twenty-eight in October and the first twenty-two days of November. During this time there were two periods of nine days each when his diary is silent. Discounting these two periods he worked nearly every day of his sojourn in Utah. One suspects the reason for his arduous schedule may have been more compelling, but it may be that the quiet nature of Mormon communities had something to do with the way he drove himself. He noted with bemused regret, for instance, that Logan’s Fourth of July celebration, “was made up entirely of patriotic speeches

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7 Roberts, *Hoof Prints in Forest Ranges*, 29–32.
and music.” His second sabbath in the area he sought relaxation in Logan — it was his only try. Rarely equalled in pungent brevity, his entry for that day tells much: “Sunday at Logan — nothing doing.”

From July 1–18 he canvassed the region of the proposed Cache reserve which unlike the present Cache National Forest did not extend into Idaho. After a lapse of nine days he resumed work at Murray on July 26 traveling up Big Cottonwood Canyon — the upper reaches of which he found so denuded of timber that in his words “It would be difficult to find a seedling big enough to make a club to kill a snake.” Working every day until August 16, he gave what he called the North Wasatch Forest close inspection. On the seventeenth he turned to the Wasatch Plateau at Thistle. Dog-legging his way back and forth, he spent the remaining days of August, all of September, and to the tenth of October examining the region north of Salina Canyon. The next two-and-a-half weeks saw him pushing into the progressively more primitive regions of the Fish Lake Reserve and the Thousand Lakes and Boulder mountains. Then, as early snows began to impede his progress, he rushed to cover the proposed Sevier reserve most of which lies within the present-day Dixie Forest. Toiling past snowed-in bands of sheep, he came twenty-seven miles from Orton to Circle Canyon near Circleville on the twenty-second of November to complete his tour.

In the course of his 145 days in the field he traveled far. Failing to record mileage in Cache Valley, his incomplete record logged a total of 3,077 miles. Of this amount 808 were by train. In 84 working days he traveled 2,269 miles by wagon, horseback, and on foot — making an average of 27 miles per day. Though his estimates may well have erred, the distances are nevertheless impressive, especially when one considers the terrain through which he passed. Indeed, the feat is awesome in view of the fact that he visited every mine, sawmill, dipping vat, mountain resort (there is no evidence that his interest was other than business), rancher, town meeting, and public official that he passed en route.

For the most part he traveled alone and by horseback. Where wagons could pass he sometimes availed himself of this means of traffic. Prompted by occasional moods of enthusiasm for the public weal, or
possibly by some nagging administrative curiosity, he sometimes left his horse to scramble several thousand feet up some mountain peak. Often some friend of conservation accompanied him on his trek and at least twice, once near Nephi and once in the lost tangles of Boulder Mountain, he hired local guides. If he had troubles in these travels or found them inconvenient he kept it to himself, although not long after the reconnaissance began he was kicked by a mule. Laconically recording this event on August 8, a day during which he logged twenty-five miles up Daniels Canyon and along Strawberry Creek, he noted “Commenced the day by being kicked by a mule. Fortunately I have become thoroughly toughened and no serious damage was done.”

But what of the country through which Potter moved? Much was common to the entire region. Aside from the physical similarity of the mountains, there was sameness both in the drought of that year and in the burden of the ravenous livestock licking leaves down from high on the trees or chewing mole-like into the dust after errant roots.

But there was also diversity. While Potter does not dwell upon the point specifically, he saw striking differences in the intensity of nongrazing uses. In 1902 the far south, particularly the Thousand Lakes and Boulder mountains area, was still a wilderness. It is true prospectors and stockmen knew it well, but the embellishments of civilization were largely lacking. To the north, by contrast, society seems to have swarmed over the entire range in its quest for livelihood. This fact was especially apparent in Cache Valley. There settlers had encroached far up the mountains in a wide variety of ways. The forested areas had been heavily lumbered for years. Potter found evidence of cutting and recutting. He saw it in place names — names such as Temple and Tie canyons or Pole Heaven
which all bespoke earlier industry. Stark evidence of cutting and then cutting again before reproduction had occurred was easily seen. The result was a product of decreasing value, and it was a rare area indeed where top-grade timber was to be found. Many spots had been worked successively for lumber, for ties, and piling timber, and finally for telephone poles until no living timber was left. Sawmills, abandoned mill sets, wagon roads, ugly gouged dump sites where logs had been pushed down sharp inclines, he found in plenty. To reach inaccessible plots of virgin timber one operator had laid out $3,000 in road construction at one site and $1,000 at another — sums Potter thought him unlikely to regain. Though obviously hard-pressed to find saw timber, the same operator ran two mills, one for summer work and one for winter.

Civilization in the form of power plants had long since invaded the mountains adjacent to Cache Valley. One power plant, which was of such antiquity that Potter referred to it as the “old plant of the Logan Electric Company,” had already been abandoned and was falling in decay. Other plants belonging to the Logan Company and the Hercules Power Company that supplied Ogden were noted. Elsewhere, in what was to become the Cache Forest, a surprising number of mining operations scratched for subsistence. Potter visited at least a dozen which were in the main lead mines, although some of them produced copper as well. Humanity’s scar had likewise been laid on the Cache highlands in the form of farms and gardens, fenced areas, roads both private and public, as well as the inevitable livestock operations. Interestingly, Potter noticed that ground squirrels were a great pest all over the proposed Cache reserve and especially to farming operations. With reference to this problem he wrote:

At Mr. Dewitt’s ranch on Logan Creek a little field, which was formally [formerly] farmed had to be abandoned on account of their ravages. At Montrose sawmill I saw men catching them with fish poles and a string noose. The squirrels being baited with grain spread out upon canvas. They caught 100 in about one hour. At Meadowville some of the farming lands have been abandoned and the settlers removed on account of the damage done by these pests.

In sum, Potter’s survey of the Cache Valley area portrayed a hard working but not overly productive forest whose users were beginning to

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14 Ibid., 6.
15 According to Joel E. Ricks and Everett L. Cooley, the Logan Electric Company’s first power plant dated back to 1880, only one year after Thomas Edison perfected the incandescent lamp. See Joel E. Ricks and Everett L. Cooley, eds., The History of a Valley: Cache Valley, Utah-Idaho, (Logan, 1956), 227.
recognize the need for regulation and restraint if its long-run potentials were to be achieved.

An impelling concern to Potter on the entire tour of Utah's forests was the livestock industry, which was well established with both cattle and sheep running on every mountain range. In the main, the cattle business was one of small holding. Settlers and Mormon villagers, who characteristically owned small irrigated farms, generally made from 10 to 150 head of cattle part of their operation. These they ran on mountain pastures during the summer and grazed and fed on lowland bottoms and fields in the winter. For cattlemen of this kind the mountains with their grazing resources as well as water for irrigation were absolutely essential. Betraying strong sympathy for them as well as a clear understanding of the realities of their situation, Potter emphasized their basic stake in the region's forests and recommended that all caution should be exercised to protect their rights in the new forest reserves.17

While most of the cattle operations were small, several outfits of more than modest size were observed, but these stand out by merit of their uniqueness. At Heber, for example, owners pooled their stock and ran them jointly. Although they did not limit their operation to reservation lands, they leased range from the Indians at a cost of $12,000 per year. At Potter's stated lease price of $100.00 per section, this amounted to nearly 77,000 acres and constituted one of the largest ranges held by any single interest. Charles Carter, also of Heber, leased 45,000 acres of reservation lands.18 But the largest cattle operation observed by Potter was the Ireland Land and Cattle Company. Headquartered at its Gilson Canyon Ranch near Salina it sprawled through several locations and ran thousands of animals. It had also used the heft that came with its size to take over government lands, having, according to some accounts, as much as 40,000 acres of the public domain under its fence. Taking advantage of state lands, the Ireland Company had also claimed most of the water holes in its vicinity and, using the so-called "rubber forty" technique, stretched control of the water to the domination of the entire area.19 Farming was very much part of its operation and hundreds of tons of meadow and alfalfa hay were raised and fed to wintering stock.

17 Ibid., 36.
18 Ibid., 13.
19 "Rubber Forty" was a term applied by early foresters and other land management officials to the practice of acquiring deeds — by means of entry under federal programs, manipulation of state lands or purchase — to small plots adjacent to streams and springs and using control of water thus acquired to monopolize vast arid ranges.
Potter’s investigation of the region south of Spanish Fork Canyon indicated the past existence of numerous dairy operations. A few miles south of Thistle Station lay Dairy Fork; at the south end of the Sanpete Mountains, Dairy Canyon was a conspicuous feature; and on the remote Boulder Mountain were sites of numerous abandoned dairies. None of these lay near any market and all had been in long decay. Potter’s inquiry verified a well-known fact of Utah history — that many of the first cattle operations to follow withdrawing Indians onto the Wasatch Plateau were summer dairies. Milking up to 150 cows, these mountain dairies took advantage of good feed to raise a calf crop and at the same time make cheese and salt down butter. However, in 1902 the day of mountain dairying had passed. Such places had not been able to compete with sheep herds, which in Potter’s words, “grubbed away at the grass roots,” and had been “given up for dairying on account of the scarcity of feed.” 20

But sheep were Utah’s big forest industry. Reaching peak numbers in 1893 when a wool clip of 14 million pounds had been recorded, the count was still high when Potter made his survey. 21 While Potter saw sheep — and lots of them — on the entire Wasatch Range, Cache Valley and the mountains adjacent to the Sanpete Valley were areas of concentration. Potter himself estimated sheep numbers on the Cache reserve at 150,000 though tax forms showed only one-half that number. Sanpete residents, in boasting moods, claimed that a million head ran their forests, a fact — if indeed it were a fact — which gave them claim to being the nation’s largest sheep county. 22 In a lament one Salina cattleman woefully informed Potter that no fewer than 150,000 sheep had scoured the Salina watershed during the summer of 1901. 23

Unlike the cattle industry, sheep raising was not tied to farm property and winter feeding but was a matter of running summer and winter on the public domain and of unbridled competition for feed. Given this condition and the other modes of the era, one could get into the sheep business with little or no cash outlay. Many sons of Sanpete found no land to farm and turned to sheepherding. It was a quick step from a wage-earning sheepherder to a manager on shares and from that into the status of full-fledged sheepman. By this process, growth had been rapid and with it came change and tensions. Traditions such as

21 Manti Messenger, July 17, 1897.
22 W. H. Lever, History of Sanpete and Emery Counties, Utah, (Ogden, 1898), 39.
accustomed ranges and the rights of prior use still had some validity, and some sheepmen ran close to home. But the general picture in Potter’s time was one of foraging far afield. The transient herd, cutting feed and mountain cover to ribbons as it rushed the season to beat some other tramp to a bit of grass, was a well-known phenomenon. Grazers with whom Potter came in contact ran on Utah’s West Desert in the winter and in the summer trailed to Idaho or through northeastern Utah and on into Colorado. Conversely, Colorado herds invaded the East Desert and crisscrossed what later became the Manti National Forest. One Fountain Green writer, well aware of the money coming to his village in herding and shearing pay as well as profits, complained:

The sheep industry is important. It keeps money in circulation. Rapid growth nearly demolished and ruined all the stock range. Cattle have some rights and should be protected and encouraged as well as their bleating relatives. The first thing to protect them from are the inroads of the sheep themselves. When a man gets sheep he loses his conscience and gets a good supply of gall instead; for he never hesitates to move in and eat the last vestige of feed intended for the village folk’s cows, say nothing of their range for dry stock.

24 Interview in September 1968 with Soren M. Nielsen of Mt. Pleasant, who ran sheep in the country in the years around the turn of the century.

Sheep eating their way to winter range on the desert were the bane of cattlemen in the early days. Utah State Historical Society photograph.
And finally, sounding just a little like Brigham Young or Heber C. Kimball in an early address to the Saints, the Fountain Green writer emphatically declared: “This should not be, sheep are all right in their place, but their place is not a community’s cow range.”

Potter also exhibited a lively interest in mines, reporting visits to many mines and conversations with some operators. In the Cache area he found a dozen or so small lead and copper mines. Between American Fork Canyon and Park City he observed many worked-out mines, slopes denuded for mine timbers, and the old Alta tramway, as well as some working mines and much evidence of claims. Hopes were still high that a “mineral belt” extending from American Fork Canyon to Park City would yield unprecedented quantities of gold and silver.

In Carbon, Emery, and Sanpete counties Potter visited scores of coal mines and their attached camps. The largest of the latter were probably Scofield, which by the end of the decade came near capturing the county seat from Price, and Winter Quarters where he saw “300 houses and a population of 2500.” In Huntington Canyon there were dozens of mines and claims, some of them producing coal, and at least one producing coke for an eastern syndicate. He learned that the Utah Coal Company was working one Huntington Canyon mine from which it supplied the Sanpete County towns often loading out as many as “fifty teams per day.” Referring to the coal lands generally he wrote, “I do not think there is any doubt but that these lands are more valuable for the coal they contain than for timber or grazing.” Also passed in the course of his tour were a paraffin mine and several oil drilling operations. None of the latter appears to have resulted in oil producing wells, but they did contribute names to several landmarks.

Throughout his entire survey Albert Potter was deeply concerned with people and their attitudes, particularly those attitudes that impinged upon the creation of forest reserves. As indicated previously, he found some animosity toward sheep and those who ran them. Often sheep were charged with violations quite beyond their powers. For example as early as 1869 a short item in an Ogden daily had noted that pastures in the flats between that town and the Great Salt Lake had been

26 Potter, “Diary,” 21. Two years prior to Potter’s visit Winter Quarters had suffered one of the most devastating disasters of American mining history when 200 men were killed on May 7, 1900 in an underground explosion.
27 Ibid., 29. The site of this operation was probably Connellsville some miles above the forks of the Huntington, where ruins of coking ovens may still be found.
28 Ibid., 30.
“poisoned by the breath of sheep.” The Mormon bishop and others at Fountain Green in Sanpete County had protested the “pestilence” of encroaching herds for some time and did not hesitate to unburden themselves to Potter and make known their desire to have certain areas designated under the proposed reserve as town range for milk stock. A year or two later, prominent Utah artist H. L. A. Culmer would find the country to be “sheep-cursed” and that it was necessary to medicate water because of its “sheepy flavor” when he traveled from Thompson Station on the Denver & Rio Grande Western Railroad by way of Moab and Monticello to San Juan County’s great natural bridges. And Utah was not without her occasional sheep-cattle feuds. In 1897, for example, masked cowboys had tied and blindfolded herders, then slaughtered 800 head of bucks near Vernal. In the same outburst a Basque herder disappeared, apparently murdered by the marauding riders.

Yet to Potter’s eyes, made wise to the sheep-cattle controversy’s potential for bloody violence by firsthand observation of Arizona’s Pleasant Valley War, relations between Utah sheep and cattlemen seemed remarkably amicable. Time after time he referred to working modus vivendi whereby the parties accepted mutually agreeable range divisions. Among the cattlemen (the majority of whom it should be remembered were also small farmers) he found some feeling that cattle should be protected from sheep but also a willingness to give the devil his due that boded well for “give and take” as forest regulations came to be applied. In Cache Valley, at least, sheepmen too were submissive, agreeing to cooperate with regulatory efforts, and nowhere did Potter’s overtures elicit downright hostility. In sum he was optimistic that the human elements in the grazing equation could be adjusted to the added dimension that would come with the creation of forest reserves.

But what of the more direct attitudes toward forest conservation? Potter was concerned about this question and constantly attentive. It appears, however, that he was more interested in allowing people to vent themselves than in weighing their opinions. Reference has been made to his contact with public officials. Church and economic leaders too were sought out, and he rarely missed an opportunity to meet the gathered public. Everywhere he found interest and in most cases clear-cut though

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29 Salt Lake Daily Telegram, May 14, 1869. The Daily Telegram had recently been transferred to Ogden in anticipation of the new importance the transcontinental railroad would give that city.
31 Manti Messenger, July 31, 1897.
differing opinions. Division in public opinion varied geographically. Beaver County, having experienced neither shortage of timber nor difficulty with its watersheds, was generally opposed to the entire concept of conservation. The town of Levan was, according to Potter’s notes, not “interested in the forest reserve” which apparently meant it was in opposition. 32

Elsewhere the pros and cons divided mainly according to economic interest in sheep. Cattlemen, farmers, and townspeople generally favored reservation. Sheepmen and associated industries were opposed. In addition to this dividing line, Potter also observed a deep-seated commitment to private ownership. Time after time he was told that the problem of management would best be solved by opening lands to entry or purchase. Some thought the appetite for private land was insatiable, and one Sanpete sheepman of rugged optimism opined that every acre in the vast Wasatch Plateau would be quickly purchased if offered for sale. 33 Sentiment for private ownership seemed most prevalent in the Sanpete-Sevier region. To Potter, with less than a year in the Forest Service (he had become head of the Branch of Grazing on October 1, 1901), their arguments seemed to have much to back them. He noted on repeated occasions the superiority of both management and land where private ownership prevailed. It should be noted that he also recorded that the best lands had somehow become state lands and then opened to purchase. Where private interests were expressed in leasing, more intelligent and effective use was also discernible. Sympathetic to private management, he recommended that the mountains west of Fountain Green be left open to let the process of entry via homesteading and application to the State Land Commission take its course. The comment that accompanied his recommendation follows:

The lands which have already been applied for are well distributed between the different stockmen and the general sentiment of the people in the vicinity of these lands is that they be allowed to complete their title. It is believed that the range will be taken care of by the owners fully as well as the Government could care for it under forest reserve management. 34

Cache Valley welcomed Potter’s survey and appears to have petitioned that a forest reserve be established and established quickly. People there had observed the decline of their forests and were likely somewhat

33 Ibid., 29.
34 Ibid., 28.
influenced in their favorable disposition by the Agricultural College. An organized movement headed by a Forest Reserve Committee existed though it is difficult to tell from Potter’s diary just how influential it was. On arriving in Logan, he had been met by the Forest Reserve Committee’s representative, Tom Smart, who was himself a sheepman. Smart was anxious to see transient herds excluded entirely and sheep and cattle numbers reduced generally to restore the ecological balance of the forest, thus normalizing water runoff which had been tending to spring floods during the years just past. Lyman R. Martineau, also a member of the Forest Reserve Committee, was deeply concerned about culinary water. Sheep, he said, “fouled the water and tramped the range up so that the amount of silt in the streams was much greater after a heavy rain.” 35 But residents of Cache Valley and Utah generally surprised Potter by their failure to connect unregulated lumbering with floods and erosion. Characteristic of their failure and of Potter’s response to it is the following from his report of a meeting with a Cache County citizens group:

Said they wanted stock excluded from it so as to prevent them fouling the water; they think the health of the town is endangered by stock dying near the stream and by the pollution of the water by the manure and the urine. Denudation of the slope by timber cutting diminishing the water supply does not seem to alarm them.36

Not surprisingly Potter found a few who advanced bizarre theories favoring the status quo. One such was a Cache Valley sawmill operator who:

Said it took a 10 inch pine tree 12 years to grow, consequently there is no need of any alarm regarding a scarcity of timber. Said the timber did not increase water supply, as the snowbanks were all outside of timber in canyons where it had a chance to drift. Said after a snowstorm the first place that the ground was bare was next to the trunk of the trees. Said sheep were the cause of water shortage; they tramp the ground up into a dust which is full of air and when the rain falls it does not soak into the dust but just runs off on the air bubbles in the dust, consequently the theory of packing the ground is all wrong as the water never gets through the air in the dust.37

Potter’s evident disgust with such arguments was somewhat offset by support for the Division of Forestry’s ideas about deforestation from a faculty member of the Agricultural College. Professor G. L. Swendsen was quoted as favoring nonuse for at least two years and:

35 Ibid., 2.
36 Ibid.
37 Ibid., 8.
gave measurements of Logan River and Summit Creek showing that since deforestation and damage to range, floods have come down earlier in the spring and streams have almost gone dry later in season when the water was most needed.\textsuperscript{38}

Sawmills, fires, floods, and various other forest-related themes also came under close scrutiny by Potter, but the materials discussed above provide an adequate basis from which to consider his tour in the broad sense. In 1902 Utah was well into its social and economic development. Hundreds of agricultural villages and towns had been established, most of them near or in the area of Potter’s survey. For fifty-five years the stewardship of the state’s natural resources had been almost entirely in private hands. Mormon cooperation and frugality had led to careful development of primary water resources. Mining had come late but played the major economic role in 1902. Western railroading had brought two important railroads into Utah and sent numerous local spurs through its valleys. After a slow beginning in the early decades, livestock had boomed following 1885 to become a major industry. Each of these and other forces had affected Utah’s forests.

Potter’s mountain survey evaluated the impact of this human use, finding that it had seriously impaired the productivity of the state’s natural resources and that floods, erosion, and polluted water supplies were becoming threats to human life and property. Potter also sampled attitudes and found that the balance of opinion—both public and official—favored the protection and management of forest resources. His own character and commitments are apparent in the day to day notations of his diary. He was practical rather than theoretic. He was obviously a practitioner of Gifford Pinchot’s “conservation through wise use” concept but was at the same time strongly oriented to people and in his observations and recommendations was sympathetic to private ownership, to the needs of the many as distinct from special interest, and to the public interest generally.\textsuperscript{39} His own preoccupation with livestock and long experience with the practical aspects of grazing show clearly in the diary and in the geographic and administrative arrangements that grew from his survey. On the other hand he was not blinded to other develop-

\textsuperscript{38} Ibid., 9.

\textsuperscript{39} For a concise statement of a typical “conservation through wise use” see Henry Clepper, ed., \textit{Origins of American Conservation}, (New York, 1966), 4–5. James Wilson, secretary of agriculture at the time the Forest Service was transferred from the Department of the Interior to the Department of Agriculture, gave official expression to the concept when he wrote Gifford Pinchot “that all land is to be devoted to its most productive use for the permanent good of the whole people. . . .”, letter of February 1, 1905, in Manti-LaSal National Forest Historical Files.
ments by his interest in livestock and recognized in the coal fields of the Wasatch Plateau, in the watersheds of numerous villages, and in many other cases that mining, drinking water, or other resources were more important to an area than grazing.

The survey of 1902 was a pioneering step — a beginning for resource management. It led directly to the establishment of most of Utah’s national forests and indirectly to the practices of other land management agencies. The months of Potter’s visit were in this sense a time of beginning and the tour itself an event of considerable importance to Utah’s development.

 PURE WATER. — An old writer said that cleanliness is akin to godliness, and a good many people now think it is a part of it; but there is a possibility of attempted cleanliness being something very opposite. We have all reason to admire the pure streams of water that gush from the canon and gurgle down by our sidewalks; but it is not so pleasant to those in the south and west parts of the city, when the dwellers nearer the mouth of the creek wash bedsteads, buggies, tubs, and other articles in them, or allow pigs to take their ablutions there. Don’t defile the water near the head of the stream. Bug juice isn’t pleasant, nor even the grease and dirt off buggy wheels! (The Salt Lake Herald, June 15, 1870)
Reclamation and the Economic Development of Northern Utah: The Weber River Project

BY STEPHEN A. MERRILL

The streams which cut through the precipitous Wasatch Mountains and flow over the flat plain toward Great Salt Lake have always been one of the principal attractions of Weber Valley. Trappers who first explored this area in the 1820s came to regard it as one of the best sources of beaver in the Intermountain region. Peter Skene Ogden of the British Hudson's Bay Company and Jedediah S. Smith of the rival American Rocky Mountain Fur Company are just two of the mountain

Echo Dam, 1935, showing the spillway and the reservoir which stretches four and one-half miles behind the dam. Salt Lake Chamber of Commerce photograph.
men who trapped, camped, and rendezvoused near the junction of the Weber and Ogden rivers (present site of the city of Ogden).\textsuperscript{1} Twenty years later, in 1845, Miles Goodyear found the same site amenable for his Fort Buenaventura, a “Half Way House” for immigrants to California and Oregon.\textsuperscript{2} By then, however, the days of profitable trapping in what later became Weber County were numbered.

Soon after the Mormon arrival in Salt Lake Valley, Brigham Young sent parties north, south, and west to find the areas most suitable for large-scale settlement.\textsuperscript{3} To secure Mormon dominion over Cache and Weber valleys for the purpose of exclusive colonization, the church authorized James Brown, former captain in the Mormon Battalion, to negotiate with Goodyear for title to his land and improvements. The settlement, for $1,950, was concluded in November of 1847.\textsuperscript{4} The following January, the James Brown family became the first Mormon settlers in the Weber Valley. In the summer of 1848 Brown’s two sons, Alexander and Jesse, built a dam on Canfield Creek and turned water onto their land to raise wheat, corn, watermelon, cabbage, and turnips, thus becoming the first irrigators in Weber Valley.\textsuperscript{5}

The early history of Davis County to the south of Weber followed a similar course. Trappers were the first white men to explore the area, followed in 1847 by Mormon pioneer Hector C. Haight known as the founding father of Farmington, the county seat. The rich loam soil was ideal for agriculture, but the spring-fed streams from the Wasatch Mountains ran, unchecked, into Great Salt Lake. Diverting this water for irrigation was a problem for the early settlers to solve.\textsuperscript{6}

The Weber settlers soon proved the northern portion of the valley of the Ogden and Weber rivers to be one of the most productive areas in Utah. Agriculture (soon expanding to include alfalfa and fruit raising

\textsuperscript{1} See Dale L. Morgan, \textit{Jedediah Smith and the Opening of the West} (Indianapolis, 1953) and also David E. Miller, ed., “Peter Skene Ogden’s Journal of His Expedition to Utah, 1825,” \textit{Utah Historical Quarterly}, 20 (April 1952), 159–186.
\textsuperscript{4} Ibid., 47–48. See also Charles Kelly and Maurice L. Howe, \textit{Miles Goodyear: First Citizen of Utah} (Salt Lake City, 1937), 86–90 and Utah Historical Records Survey, WPA, \textit{Inventory of the County Archives of Utah}, No. 29, Weber County (Ogden, 1940), 6–8.
\textsuperscript{5} Milton R. Hunter, \textit{Beneath Ben Lomond’s Peak, A History of Weber County, 1824–1900} (Salt Lake City, 1966), 67.
as well as grains and vegetables) and stock raising became the two most important pioneer industries. Weber, unlike other parts of the territory, did not initially suffer from a lack of water. The natural flow of the two rivers and their streams could provide a full water supply to about 3,000 acres of land. Two problems did develop, however, in the years that followed: first, was the problem of obtaining water for additional lands, and second, that of controlling the flow of the two rivers, which after the winter thaw either soaked into the valley floor or poured into Great Salt Lake, leaving little water available for irrigation in the late fall months.

The expansion of irrigation facilities met the settlers’ pressing need for food during the first years and solved the first water problem during the remainder of the century. Canals were dug in 1848 and 1849 to divert water from the two rivers; they were extended to other settlements in the county in 1851. Originally small ditches, the canals were enlarged, lengthened, and multiplied into extensive irrigation systems to meet the demands of an increasing population. Perhaps the most important of these enterprises was undertaken in 1852. With funds advanced by the Weber County Court from county revenue ($2,970 to 1855), Ogden city constructed a seven-mile canal from the Weber to Riverdale in order to provide water for the lower area of the city. Stock in the canal was issued by the city in payment, and construction was completed in 1854 on the condition that control remain in the hands of the city and county. Farmers using the water were directed to pay an annual fee per acre for its upkeep. Although the organization of canal enterprises into stock companies was characteristic of irrigation development among the Mormons, only Weber and Salt Lake among the Utah counties appropriated public revenue for the construction of irrigation systems.

Water soon became important for other uses as the Weber economy became more diversified: for waterwheels, for lathes, sugar mills, and gristmills; for the raising of sheep and cattle and the production of meat, dairy, leather, and textile products; and, of course, for culinary use. With the arrival of the transcontinental railroad in 1869, Utah began to export its products and Ogden became one of the territory’s most important commercial as well as agricultural centers. Economic development was

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accompanied by more efficient organization of irrigation. In 1865 the Utah territorial legislature passed the first irrigation district law in the United States, providing that districts organized under it be permitted to tax the lands within their boundaries to raise the revenue necessary to provide a water supply and meet the costs of operation and maintenance. Around 1890 a movement among irrigators in Ogden and Salt Lake to make local governmental bodies relinquish control of these districts resulted in the organization of the Weber Canal Company. Farmers became stockholders (in proportion to the amount of water they used) in the firm and took over management of the irrigation facilities.\(^9\)

Yet, as water needs climbed, Weber and Davis county users found serious irrigation problems unsolved.\(^10\) Civil engineers Willard Young and Frank C. Kelsey, in the last months of 1907, made an investigation of these problems and reported on a proposed Weber River Irrigation Project. They recommended that a private irrigation company construct the necessary storage dam, canals, and laterals and purchase the land which would be served. This land would then be subdivided and sold in tracts with water rights. Among the proposed facilities was a dam and storage reservoir on the Weber River, near Echo.

The United States government, which became involved in reclamation under the Carey Act of 1894 and moved into the business under the Federal Reclamation Act of June 17, 1902, demonstrated interest early in the problems of Weber County. The Reclamation Service made a reconnaissance survey of the area in 1904 and 1905 which resulted in the establishment of stream gauging stations by the Geological Survey in the latter year. A contract dated January 3, 1922, (and renewed as late as 1929) between the Reclamation Service and the Utah Water Storage Commission of the state of Utah, provided for federal investigation of irrigation projects in the whole Salt Lake Basin of northern Utah. The investigations, conducted to begin with at state expense and later at joint federal-state expense, were intended to yield specific construction proposals.\(^11\)

Activity and interest centered immediately on the Weber River area, which became known as the first or Wasatch Division of the envisioned


\(^10\) Elizabeth Tillotson, ed., *A History of Ogden* (Ogden, 1961), 70.

Salt Lake Basin Project.\textsuperscript{12} In 1924 engineers selected a site on the river for the first dam and reservoir — forty-two miles southeast of Ogden — and simultaneously proposed a secondary feature, a nine-mile canal above the dam to divert some water to the Provo River and, consequently, to lands in Utah County. Receiving congressional approval in 1924, the Echo Dam was designed to provide supplemental irrigation water for 60,000 acres of land in the lower Weber and in Ogden Valley and 20,000 acres of land in the Provo Valley.\textsuperscript{13}

On December 16, 1926, the secretary of the interior contracted with the then newly-formed Weber River Water Users Association to construct both the dam and the canal. The United States agreed to create a reservoir with an estimated capacity of 74,000 acre-feet, to construct a canal with a capacity of 210 second-feet, and to furnish the members of the private corporation with water between April 1 and October 31 of each year. In turn, the association agreed to distribute the water in compliance with the federal reclamation law to individual stockholders in the association (individuals and canal companies) and to operate and maintain the reservoir at its own expense after construction, and to pay the United States in annual fixed installments the cost of the facilities and the supply. That cost, not to exceed $3 million, was to be paid in twenty equal annual installments (the first to be made on December 1 of the year of completion).\textsuperscript{14}

By the time these contracts were filed (March 19, 1927), the thirty-two canal companies (serving 80,000 acres of land) had subscribed to 59,411 shares of stock. Among the most substantial subscribers were the Provo Reservation Water Users Company, the Davis and Weber Counties Canal Company, and the Hooper, North Ogden, Plain City, Warren, Western, and Wilson Irrigation companies.\textsuperscript{15}

\textsuperscript{12} The title "Salt Lake Basin Project" has since been dropped and its broad plans incorporated into such smaller present-day area projects as the Weber Basin Project, the Ogden River Project, and the Central Utah Project. Since the construction of the Echo Dam and Weber-Provo Diversion Canal, the Wasatch Division has been known exclusively as the "Weber River Project."
\textsuperscript{14} U.S., Department of Interior, Bureau of Reclamation, "Project History, Salt Lake Basin Project," (MS, Bureau of Reclamation, Region 4, Salt Lake City, Utah, 1928), 15–16.
\textsuperscript{15} U.S. Department of the Interior, Bureau of Reclamation, "Final Report on Design and Construction of Echo Dam and Reservoir, Salt Lake Basin Project" (MS, Bureau of Reclamation, Ogden, Utah, 1934), 210.
The president of the United States approved the project on January 8, 1927, under congressional acts of 1910 and 1924; funds were appropriated by acts in 1925 and succeeding years.\textsuperscript{16}

The construction of the Echo Dam, the first federal reclamation project in northern Utah, commenced on November 26, 1927, under the direction of the A. Guthrie Company of Portland, Oregon.\textsuperscript{17} The zoned, 1,540,000 cubic-yard earthfill structure, 158 feet in height, was constructed by sprinkling and rolling eight-inch layers of clay, sand, and gravel. Both upstream and downstream slopes are blanketed by heavy layers of conglomerate rock fill. A concrete cut-off wall, bonded to bedrock, extends the full length of the dam. The spillway, with a capacity of 15,000 cubic feet per second, is fed by a concrete-lined horseshoe tunnel conduit, and the flow is regulated by four 18 foot by 17 foot radial gates. The Echo Reservoir stretches four and one-half miles behind the dam, with a surface area of 1,470 acres and an active capacity of 73,900 acre-feet. It has an average annual inflow (measured from 1928 to 1955) of 202,000 acre-feet from a drainage area of some 735 square miles. Construction of the dam was completed on October 7, 1930, at a final cost of $1,609,209.\textsuperscript{18}

Although the dam proved to be a relatively simple project, auxiliary works presented some difficulties. The location of the dam and reservoir necessitated the relocation of a portion of the Park City branch of the Union Pacific Railroad and a portion of the Lincoln Highway to routes above the reservoir flow line. Contracts with the Union Pacific (dated September 24, 1927) and the Utah State Road Commission (of September 28, 1927) cost the United States $189,000 and $161,076 respectively.\textsuperscript{19}

Several miles above the reservoir (near Kamas, Utah) the diversion canal was dug in a generally southerly direction nine miles to the Provo River (and completed in April of 1931). The plan was to divert water to subscribers in the Provo Valley only at flood times when the priorities

\textsuperscript{16} "Project History," 7.
\textsuperscript{17} It was also Utah's second federal reclamation project, the Strawberry Dam and Reservoir having been completed in 1913.
\textsuperscript{19} "Project History," 9–10.
on the Weber River received their full quota or at lower stages of the river when water could be released from the reservoir to supply early priorities in place of the water taken out by the canal. Having built the canal for a capacity of only 210 second-feet, the bureau nonetheless foresaw its enlargement following the construction of a dam on the Provo River. The United States therefore retained full title to the canal and the right to dispose of its capacity “so that the United States may enlarge said canal for other possible developments which the U.S. may undertake in the future in connection with the Salt Lake Basin project.”

The construction of the dam and enlargement of the canal were, in fact, completed as part of the Provo River Project in 1947.

This, however, under the terms of existing contracts, was not the disposition of the Echo Dam. In June of 1931 the United States informed the Weber River Water Users Association that construction of the Weber River Project was essentially completed and instructed the corporation to assume control over the maintenance and operation of the dam and reservoir on July 5, 1931. The association was also instructed to assume as of December responsibility for the repayment of the total

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construction cost of the project, amounting to $2,869,975. General economic distress during the depressed years of the 1930s, however, forced a deferral of payments. Authorized by moratorium acts of Congress, payments of $148,158, $143,853, $143,853, $143,853, and $71,926 were deferred for the years 1932, 1933, 1934, 1935, and 1936, respectively. In December of 1938 the contract between the United States and the Weber River Water Users Association was redrafted, extending the repayment period to thirty years. Charges deferred were included in the new repayment schedule. Since 1938, the association has established a notable record in adhering to the terms of that schedule; charges accruing have equalled payments made for every year. Repayment was completed in 1967.

According to original expectations, as a Bureau of Reclamation report has noted: "Under normal operation spring flood waters are stored and later released during the irrigation season for use on project lands. This cycle is repeated each year with very little carry-over of stored water from one year to the next." Although Echo Reservoir did not reach full storage capacity for some years, the project had an immediate and vital impact on the economy of the Weber and Ogden River Valley. Not only did the 1930s wreak havoc with farm prices and costs but they also brought years of drought to the Mountain West as well as to other parts of the country. Few statistics are available, but Commissioner of Reclamation Elwood Mead graphically expressed the importance of the just-completed Weber River Project in a speech in Salt Lake City on June 23, 1931:

Those of you who will go to Ogden . . . will see a country that would have been in desperate straits had not that reservoir been practically completed for storage of water this year.

In his report for the fiscal year 1931, the commissioner further stated that although only 12,000 acre-feet of water had been stored in the reservoir during the summer of 1930 (the final months of construction), they had proved "very valuable in maturing fruits, vegetables, and other crops on the project lands under the Weber River."

The general economic condition of the farming districts was very good, although they were affected somewhat by the general depression.

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23 The Salt Lake Tribune, June 24, 1931.
Practically no farms were abandoned in 1930, and mortgage foreclosures were quite unusual. The population of the rural districts is stable, as is indicated by the constant increase in the construction of modern farm homes. The value of farm crops in 1930 varied from $15 per acre on hay and grain lands where the water was deficient to as high as $200 per acre on fairly well-irrigated fruit lands. The average crop value was estimated at $35 per acre for 75 per cent of the division and $100 per acre for the remainder. With a dependable later season water supply from the full use of the Echo Reservoir, there will be a decided increase in the higher-priced crops.24

The commissioner's predictions were not, in fact, fulfilled in 1931–32, primarily because the Utah stream flow was the lowest on record in the history of the state. The value of farm crops in that year varied from $9 per acre on hay and grain lands where water was deficient to as high as $150 per acre on irrigated fruit lands. The commissioner, however, in his report for the fiscal year 1932, termed the 19,200 acre-feet of water stored in Echo Reservoir "exceptionally valuable" for such crops as fruits, vegetables, and sugar beets, and concluded that "at least 30 per cent of the gross value of all crops resulted from the use of the storage water." Although all farmers by then were feeling the effects of the depression, their general economic condition remained "good"; few farms were abandoned and there were few mortgage foreclosures.25

In these and subsequent years water released from Echo Reservoir has been diverted from the river into more and more privately-built canals and laterals leading to irrigable land. The project now provides its supplemental irrigation service to approximately 109,000 acres included in 3,900 farms, primarily in Weber and Davis counties. The soils of the area, being generally deep, fertile, and well drained, are suitable for the abundant production of sugar beets, fruits, vegetables, alfalfa, potatoes, berries, barley, and wheat — the fruits and vegetables being produced for both canning and trucking. "The stored water in Echo Reservoir has continuously boosted these crops values," which, in recent years, have averaged in total approximately $9.5 million.26 In addition, the project has directly encouraged the growth of dairying and stock raising and the formation of cooperative associations for the production and sale of canning and packing crops, sugar beets, dairy and poultry products, and livestock.27

26 Reclamation Project Data, 1961, 815–16.
The continued prosperity of agriculture in the Weber area (encouraged also by the second federal reclamation enterprise in the area, the Ogden River Project, 1934) has not been the only important economic trend in Weber and neighboring counties.

During and following the World War II, military establishments and industry expanded very rapidly in the Weber River drainage area, and this trend has continued with a tremendous growth in population. These facts made it necessary to increase the water supply . . . \(^{28}\)

In 1946 the Ogden Chamber of Commerce formally requested the Bureau of Reclamation to investigate the entire drainage area and the feasibility of an extensive water resource reclamation project to harness all possible surplus water. The bureau initiated that study in 1947 and discovered that despite the Echo, Pine View, and East Canyon improvements, approximately 400,000 acre-feet of water were still wastefully pouring into the Great Salt Lake from the Weber River and its tributaries. As the bureau secured authorization of the Weber Basin Project in 1947, various water users associations and chambers of commerce had formed the Weber Basin Water Conservancy District to negotiate and contract with the United States.


Irrigation projects throughout the state have made the sugar beet industry thrive. Courtesy Utah-Idaho Sugar Company. (Bill Shipler)
Although the Weber Basin Project was initiated under similar circumstances and followed a similar course of development to the Weber River Project, it was one of the first entirely multipurpose projects in the United States, providing for the development of recreation, municipal, industrial, fish and wildlife, and flood control, as well as irrigation water. The project includes five storage dams and dam enlargements (Wanship, Lost Creek, East Canyon, Pine View, and Willard), two diversion dams (Stoddard and Slaterville), several large canal and canal improvements, laterals, pumping plants, and two hydro-electric power plants.\textsuperscript{29}

The Weber River Project has always been basically a single purpose facility, and current negotiations between the Bureau of Reclamation and the Weber River Water Users Association for flood control development signify its only direct relationship to the extensive Weber Basin complex. Even though the identity and significance of the Weber River Project seem diminished beside this vast new federal enterprise, it is undoubtedly true that the project is important not simply for its benefits to agriculture, nor merely for its initiation of federal reclamation work in northern Utah, but also certainly for its contributions to the entire economic development of the Weber Valley.

\textsuperscript{29} Ibid.; Reclamation Project Data, 1961, 807–14.

GONE EAST. — The grasshoppers have taken their departure eastward we are reliably informed, making devastation by the way. Not one is said to be left in Weber valley, and but little, if anything, else is left that was green. The last heard of them they had made forced flights from Castle Rock to Wasatch, from Wasatch to Bear river, and were retarding the trains at points between Bear and Green rivers. \textit{(The Salt Lake Herald, July 18, 1870)}
The establishment of the Civilian Conservation Corps in 1933 gave a major boost to the cause of reclamation in Utah. Projects that had long been planned by the Departments of Agriculture and Interior were finally consummated with an input of financial and labor resources sufficient to spell the difference between demise and fruition.

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Franklin Delano Roosevelt was elected president in 1932 by a stricken America that hoped the progressive New York governor would be able to help the country rise from the morass of its worst depression. On March 9, 1933, five days after his inauguration, FDR closeted himself with several aides to present his ideas for putting 500,000 men to work and to ask them to prepare the draft of a bill to be submitted to Congress.

Work on the bill lasted over the next few days, and the measure, accompanied by a relief message from the president, went to Congress on March 21. Identified as "An Act for the relief of unemployment through the performance of useful public work, and for other purposes," the bill gave the president authority to hire unemployed men for works of a public nature on state and federal lands for "the prevention of forest fires, floods and soil erosion, plant pest and disease control, the construction, maintenance or repair of paths, trails, and fire lanes." Provision also was made for the extension of work into private and municipal lands when deemed in the public interest. Within ten days after its introduction, the bill had passed both houses by voice vote and had been signed by the president. Although a few congressmen and senators of both parties had made spirited opposition, the measure enjoyed a generous bipartisan support, and no one had seriously denied that the country was in severe economic difficulties. The number of unemployed in the country in 1933 is often set at twelve million, but estimates ranged to over sixteen million. Of these, experts estimated that five to seven million were young people sixteen to twenty-five years of age who were out of work.

Equally apparent was the fact that work was needed on the land. In 1933 the Department of Agriculture estimated conservatively that soil erosion cost the country over $200 million annually and that 17.5 million acres were even then beyond reclamation or cultivation. This represented approximately six billion tons of top soil that had been eroded by

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3 For a detailed description of the debates on the bill see U.S., Congress, Senate, Committee on Education and Labor; House, Committee on Labor, *Joint Hearings on Unemployment Relief*, S. 598, 73rd Cong., 1st Sess. (1933).
the forces of wind and water. Unwise timber management had wasted and despoiled millions of acres of forest resources, and, in the western portion of the country, arid areas offered optimum utilization only if water resources could be developed. The proposed conservation and development programs provided an ideal opportunity both to help alleviate unemployment and to preserve America's resources.

Officials in Washington completed initial plans, and on April 5 the president issued Executive Order 6101 to officially begin the program. Chosen to head the Emergency Conservation work — as the CCC program was originally called — was highly-respected Robert Fechner, a vice-president of the American Federation of Labor and member of the General Executive Board of the International Association of Machinists. An advisory council made up of representatives of the four participating departments—War, Labor, Agriculture, and Interior—assisted in establishing policy. Labor handled the selection of men to work in the program; War took care of them from enlistment until delivery to the camps which were to be supervised and administered by the "technical agencies" in charge of the actual work under Agriculture and Interior. Under the leadership of Miss Frances Perkins, secretary of labor, enlistment instructions were soon on their way to the states where existing state welfare agencies did the actual enrolling.

Enlistment was initially limited to unemployed single men between eighteen and twenty-five who were members of families on relief rolls. Utah’s regular quota, based on the state population, was set at 1,000. To the regular enrollees, the CCC added 1,300 “local, experienced men,” or LEMs, hired from the ranks of unemployed carpenters, lumbermen, miners, and others who could serve as project leaders. Later 100 veterans, 200 Indians, and another 1,400 LEMs were added to the rolls. Population also determined the twenty-nine county quotas for Utah’s original 2,300 enrollees which ranged from 812 for Salt Lake County down to 11 for Daggett County. Throughout the state quotas were oversubscribed as applicants swarmed into welfare offices seeking employment in May 1933.

6 Salmond, Civilian Conservation Corps, 4.
8 Salmond, Civilian Conservation Corps, 28.
9 The role of the army was soon expanded, however, to a position of nearly complete control with the technical agencies responsible for the men during working hours only. Rosenman, Public Papers, 2:107–8.
10 Deseret News, April 20, 1933.
11 Ibid., May 24, July 4, 8, 12, 1933.
12 Ibid., May 6, 1933.
The first enrollment took place in Salt Lake City on May 4 when 140 men were selected from among 4,000 applicants. Wasatch Forest Supervisor A. L. Nord certified an additional 85 LEMs. The entire group of 225 received medical examinations and traveled to Fort Douglas where the army issued equipment and clothing. The group was designated Company 940, the first to be organized in Utah.

President Roosevelt approved the creation of twenty camps in the national forests of the state and one in Zion National Park. In addition, five state camps were also authorized, primarily to work on erosion control projects. Construction on the twenty-six regular camps began in late May as advance units of men began pouring into the state, mostly from Fort Monroe, Virginia, to be joined by local boys from the Fort Douglas headquarters of the district. The first camp, located in American Fork Canyon, was completed by June 7, and within a short time all camps were operating.

From the first, officials planned an active campaign against soil erosion. State and federal conservation agencies had been concerned with the twin problems of flooding and erosion within arid Utah for several years. The Bureau of Agricultural Engineering, in cooperation with Utah agencies, had begun an organized program of flood control in 1922 with projects near Nephi for controlling Salt Creek. The control structures proved successful the following year during the severe storm of August 3, 1923, when other parts of the state received much serious damage. Willard and Farmington, two of the places most severely hit, received flood control barriers the following year under an agreement involving federal, state, county, and private agencies. In the years following, similar structures were built at more than a dozen sites in western and central Utah.

The availability of labor under the Reconstruction Finance Corporation advanced the program somewhat in 1932, but the major boost came from the Civilian Conservation Corps. Now, in the first enrollment period, the five state camps were specifically located where they could most effectively carry on the work.

Ibid., May 4, 5, 1933.

Company numbers were assigned by corps area headquarters in San Francisco. The designation indicated that this was the fortieth company to be created in the army's ninth corps area.

An additional two camps were administered by the Bureau of Indian Affairs and manned entirely by Indians. The army had no connection with the Indian camps which maintained an identity quite separate from the rest of the CCC program.

Eventually 116 CCC camps were established in Utah, although only about 35 were ever in operation at any one time.
These five camps, although designated state camps, were under the technical supervision of the Forest Service and included in Forest Service reports. The selection of projects was the distinguishing factor. Forest Service officials determined the work of the Forest Service camps, although they took the wishes of the state and the citizenry into consideration where practicable. The work of the state camps, on the other hand, was on projects selected by a state committee appointed by the governor. The two governments, state and national, worked together, however, as the Forest Service handled the fiscal responsibilities and was represented on the state committee. Companies from the Second Corps Area — New York, New Jersey, and Delaware — occupied all five camps about the middle of June.\(^\text{17}\)

Two of the camps did extensive work on the Davis County and Willard watersheds; the others worked on erosion control in central and southern Utah. They all kept busy that first summer. In little more than three months they carried out erosion control measures on 779 acres, built 100 stone dams and 200 miles of surface ditches, constructed 12 fire breaks and 24 miles of truck trails, and replanted 85 acres in trees.\(^\text{18}\) These five camps were discontinued after the first enrollment period, but the vital work of erosion control was carried on by others, as official reports and newspaper accounts can testify.

The men of the CCC tried many approaches to solving the problem of controlling the torrential rains that occasionally hit the mountains and deserts of Utah. The earliest devices were quite simple. Small check dams usually were built at the heads of canyons along the western face of the Wasatch Range. Some of these dug into the canyon walls at each end and curved upstream just like a regular dam, but others were even more elementary and simply diverted water into the brush to dissipate its eroding force.\(^\text{19}\) This technique persisted for many years in one form or another.

The terracing of mountain slopes most subject to erosion met with greater success. It was cheaper, got right at the source of the trouble, and had the added advantage of permitting vegetation to grow with a minimum of disarrangement. Although terracing was used throughout the state, the most outstanding examples were in Davis County east of Bountiful and near Willard in Box Elder County.

\(^{17}\) *The Salt Lake Tribune*, July 1, 1933.


\(^{19}\) *Evening Herald* (Provo, Utah), August 1, 1933.
Dr. Reed W. Bailey of the Intermountain Forest and Range Experiment Station attracted much of the attention given to terracing for erosion control.²⁰ Davis Mountain behind Bountiful served as his laboratory to test various combinations of terracing methods. After four years of study he published his findings which became the standard of flood and erosion control in many parts of the West.

Bailey conceded that contour terracing certainly was not a new technique, but he felt that the trenching which he utilized did constitute a revolutionary approach. Under the earlier system about seventy-five percent of the rainfall ran off, but with the trenches the figures reversed with seventy-five percent of the rainfall retained. CCC personnel constructed nine-foot-wide trenches spaced five to twenty feet apart and following the contours around the slopes. The steepness of the slope and the condition of the vegetation and soil determined the varying distances between trenches. The trench, instead of being one huge ditch, was divided into compartments or elongated reservoirs separated by low cross dams or "equalizers" constructed at right angles to the axis of the trench. These ran about four inches lower than the leading edge of the trench and permitted the transverse flow of water from one compartment to another before the trench itself overflowed. The standard depth of the trench was about one and one-half feet with greater or lesser depths depending upon the degree of slope.

The trenched terraces were designed to control melting snow and for torrential rains of up to two inches an hour, which, although they occurred very rarely, caused the most serious damage.²¹ The system took its test in July 1936 when more than an inch of rain — the heaviest rainfall on record to that time — fell in the project area in less than thirty minutes. The ninety miles of trenches kept the run-off under control and averted flooding.²² Within three years the system had been enlarged to include approximately 700 miles of trenches, enough, as one of the foremen on the job pointed out, to construct a ditch from Bountiful to Los Angeles.²³

²⁰ Most of the material in the following paragraph comes from a pamphlet Bailey wrote with A. R. Croft, Contour-Trenches Control Floods and Erosion on Range Lands (Washington, D.C., 1937).
²¹ In 1923 and 1930 floods in this area had taken eight lives and caused a million dollars in damage to farms, utilities, and roads. The Salt Lake Tribune, April 2, 1939.
²² Ibid.
²³ Ibid. Interview with W. Merrill Miller, Bountiful, Utah, July 22, 1968. Davis Mountain was retraced in 1964. Nearly three decades after working as a Forest Service foreman on the project, Miller again directed the terracing work, this time using heavier equipment. A photograph in his possession shows the present larger terraces with the remains of the old CCC terraces in between.
In the meantime, work continued at the Willard watershed in Box Elder County to the north. Forest Service officials had long known the need for rehabilitation of the denuded slopes laid waste by overcutting of timber and by overgrazing. During the winter of 1934–35 a short-lived camp in Willard did some terracing with plows and horses.\textsuperscript{24} The regional forester had advised community and county officials that the Forest Service stood ready to act on the problem but could not do so until the land shifted to public control. Not until after the disastrous flood of July 31, 1936, did the Utah State Road Commission and the commissioners of Box Elder County and Willard City succeed in acquiring the private holdings on the watershed.\textsuperscript{25} By September, the Forest Service acted, and a group of about seventy-five enrollees, four foremen, an engineer, and project supervisor John J. Wise were dispatched from the CCC camp in Hyrum to set up a spike camp on the divide between the heads of Perry Canyon and the north fork of the Ogden River.\textsuperscript{26}

The purpose of the camp was to build a road about six miles long into the Willard Basin where the erosion-control work was to take place at an elevation of 9,000 feet. The enrollees, nearly all from Arkansas, began work with jackhammers and three caterpillar bulldozers. The road extended to the east rim of Willard Canyon by October 1, and part of the crew drew assignments to work on the watershed rehabilitation. Two crews felled the dead trees in a burned-over area and laid them horizontally along the contour of the side slopes of Willard Canyon. The boys also planted several thousand conifers in the burned area as well as smooth brome and orchard grass. In the meantime the rest of the men continued the road into other parts of the basin.

There was some disagreement among personnel from the Cache National Forest and those from Dr. Bailey's Intermountain Forest and Range Experiment Station over the best type of terrace to use under the circumstances, the "V" type or the flat-bottom type. After "considerable discussion," said Wise, the engineers determined that flat-bottom

\textsuperscript{24} Interview with J. J. Wise, Ogden, Utah, August 28, 1969. J. Whitney Floyd, however, stated in an interview June 20, 1968, that he thought the camp had some machinery, although hand labor was used on most of the work. Floyd remembers surveying the Willard Basin with two enrollees in February 1935, though the flood control project began the following summer. There was no camp in Willard, however, from the time the state camp left until the Soil Conservation Service camp was set up on the same site in October 1936.


\textsuperscript{26} J. J. Wise, "Historical Information Relative to the Willard Basin Watershed Rehabilitation Project," n.p., n.d. Mimeographed copy in author's possession. Wise, still working for the Forest Service in 1969, was project supervisor on the Willard Basin Project. Most of the material on this project comes from accounts written by him and Supervisor A. G. Nord, who took over Cache National Forest in September 1936.
trenches with check dams installed twenty-five to thirty feet apart would be a better design for the area because they provided a greater surface area for water to penetrate into the ground.\textsuperscript{27}

The engineer carefully laid out plans for the terraces. Beginning at the top of the slope and working downhill, the completed terraces might protect the work in progress below should any summer storms hit the area. On completion, crews immediately seeded the terraces with domestic rye grass to provide a quick cover and with perennial grasses such as smooth brome and orchard grass to provide a slower-growing, longer-lasting cover.

During seeding operations an early snow storm provided enrollees with an adventure. The storm began on a Friday night after most of the foremen had been permitted to leave camp. By the next day snow stood waist-deep and men had to keep brushing it off the tents to prevent their collapse. Wise, in charge of the crew, radioed that the road was impassable and they would wait another day or two. On Monday the boys received orders to prepare to walk out the next morning if it became necessary to evacuate the camp. Tuesday morning, after an early breakfast of frozen onions, the caravan of about eighty apprehensive southern boys began its march. Two or three of the more husky boys led the group and the same number trailed the column to prevent straggling. They left their clothes and equipment and took only their valuables. After an exhausting eight-mile hike, they reached the trucks that had been sent to meet them and returned to the comfort of the base camp in Hyrum. After a partial thaw a few days later, they returned to scatter the final seeds on six inches of snow.\textsuperscript{28} The camp moved out November 20, 1936,

\textsuperscript{27} Wise, “Historical Information.”
\textsuperscript{28} Interview with J. J. Wise, August 28, 1969.
having completed construction of a low-standard road, rehabilitation of
the burned-over area, and terracing and seeding of approximately forty
acres of the Willard Basin. 29

The Soil Conservation Service established a CCC camp in Willard
about that time to carry out watershed work in the basin under the direct
supervision of the Forest Service. Company 736, composed of enrollees
from Kansas, Missouri, and Arkansas, arrived in Willard and continued
to work on fencing, terracing, and planting in the basin until completing
the project in 1940, after which the company transferred to Tremonton.
On August 2, 1938, the Willard City Commission unanimously approved
the donation of its watershed lands to the federal government. The
solicitor general of the United States accepted title to the tract of 1,807
acres on October 20, 1941. 30

CCC personnel used many techniques in the constant battle against
the harrassment of nature. Cloudbursts often damaged roads, threatened
towns, and raised the possibility of overflowing rivers. As a result, en­
rollees spent much time controlling stream flow. The camp at Henrie­
ville built three rock diversion walls about four feet high to divert flood
waters which might threaten the little community of Cannonville. Cedar
posts faced each other in two rows in the ground three and one-half feet
deep and four feet apart. Heavy wire netting secured both sides of the
framework and ran along the ground between the rows of posts. Crews
carefully filled the elongated basketlike affair with rocks and lashed cedar
posts across the top to complete the wall. 31 There were probably more
cribs and other types of rock retaining walls built along the Virgin than
any other river in Utah. In addition to the state camps working on the
river in 1933 and 1934, camps attached to Zion National Park spent
much time at similar tasks. Crews from the Green River camp did con­
siderable riprapping along the Green to protect farm land as well as the
community itself. 32

Where possible, flood control activities were combined with water
storage projects, especially in the desert areas in the western part of the
state. Huge herds of sheep and cattle grazed in western Utah during the

29 Wise, "Historical Information."
30 Nord, "Historical Information."
31 U.S., Department of Agriculture, Division of Grazing, Ninth Period Report, DG—33,
September 30, 1937. Reports of the Division of Grazing camps are filed by camp number and
enrollment period in Boxes 8606 and 8607 in the files of the Bureau of Land Management,
Federal Records Center, Denver, Colorado.
32 Letters to the author from Earl Partridge, Orem, Utah, April 10, 1968, and George L.
Moffitt, Orangeville, Utah, June 9, 1968.
winter months, and facilities for livestock were often in short supply. Because of the lack of suitable water sources throughout the desert range, nearly all the Division of Grazing camps spent much time and labor constructing reservoirs, developing springs, and erecting water troughs.

Construction of large dams and reservoirs got off to a slow start in Utah, but in 1937 CCC crews built 91 large dams in the state. A total of 423 large impounding and diversion dams and 309 small reservoirs were built during the program's nine years, primarily by the Soil Conservation Service and the Division of Grazing. Many different types of reservoirs were built to meet a variety of situations. The Milford camp built one of the most unusual at a site near Granite Peak. There a narrow gap about ten feet wide provided an outlet for a natural granite bowl into which water flowed from a spring. Enrollees built a concrete dam eighteen feet high to plug the gap and provide easy storage for 576,000 gallons of water. By April 1938, the reservoir had filled and water flowed over the top. A 357-foot pipeline carried water to troughs on a flat below, eventually opening up an entirely new range area west of the Mineral Mountains between Milford and Beaver.

The dams were originally built of earth strengthened by a lengthwise core which was usually dug out down to bedrock after the dam had been roughly shaped. Looking like a giant sandwich, the dam was then filled with carefully selected clay mixed with water, or puddled, as it was poured into the core. When dry, the core became almost as hard as adobe and nearly impervious. The camp at Castle Dale built such a dam in the bottom of a wash 20 feet deep and 115 feet wide. The natural walls of the dam were solid rock, and the ample clay on the bottom of the wash proved excellent for dam building. However, water was so scarce crews had to haul it in by tank truck for puddling the core.

Later, other types of cores were regarded as more successfully watertight and became, in their turn, standard for the region. Instead of earthen dams with a core of puddled clay, these were built of rock rubble or some form of dry masonry with the faces about four feet apart and capped with rock crowns. A cement mixer stirred the core material of sand and adobe clay to be puddled into the gap. Sometimes a big drum

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was connected to one end of the core by a short ditch. A dump truck with another drum mounted on its bed would back up on an overhanging ledge to discharge water into the drum for the core. After filling the core, tractor operators drove their “cats” back and forth, packing it to adobe hardness. Thin layers of dirt were also spread over the entire dam which would be further compacted by trucks.

Earth dams remained popular in many situations. The upstream side was lined with rock, or riprapped, usually to a depth of at least one foot. If practical, the entire reservoir was riprapped to reduce erosion from waves and to make it easier for livestock to drink without damaging the sides of the reservoir. Often the toe of the reservoir wall was riprapped to prevent erosion from spillway backwash. J. V. Bollwinkel, engineer of the Vernal camp, described the CCC dams as having wide tops with flat sides, principally to reduce erosion and prevent seepage. Extra-wide spillways dug out of solid rock, or rock lined, proved essential to relieve the flooding which often occurred during heavy rains. Dams and spillways were constructed to handle the occasional big storm that might come only once every fifty years but which would have the destructive potential to wash out a less sturdy structure.

The Antelope Springs camp built one huge reservoir holding 952 acre-feet which, notably, enabled five herds of sheep to water there in one day. Known as the Long Ridge project, the reservoir required the excavation of 12,000 cubic yards of earth and opened new grazing land for 125,000 sheep.

Crews from the Division of Grazing camp at Cedar City worked from December 1935 to March 1936 to construct the Big Hollow Reservoir fifteen miles north of town. Stretching 760 feet across and impounding 112 acre-feet of water, the dam was designed to take care of 500,000 sheep and 5,000 cattle as they traveled between summer and winter ranges. Four months after completion of the reservoir, floodwaters from several consecutive cloudbursts washed out a fifty-five-foot-wide swath, but by September the damage had been repaired with the reservoir reportedly stronger than before the flood.

Both the Seventh and Ninth Period Reports of Dalton Wells camp, DG–32, spoke of “new types” of dams. The prototype listed in the former report was identified as the Hook and Ladder Reservoir. One called Art’s Pasture Tank was the new type referred to in the Ninth Period Report. See also Tenth Period Report, DG–35, March 31, 1938.


Although Division of Grazing camps carried on other projects, they usually devoted most of their attention to the development of water resources for livestock. Reservoir construction required the most men and money, but spring development was also a major activity. As with the reservoirs, CCC supervisors designed the springs to suit the situation. Crews at Castle Dale built five fourteen-foot hewn log troughs which captured water brought from a higher spring and gave up about two gallons a minute. They also installed four twenty-foot troughs of galvanized iron. The ingenious Clover Creek camp used the two halves of a boiler in developing a spring. Crews from Dalton Wells developed Seven-Mile Springs by sinking a large steel cylinder down into the bottom of a wash until it struck the water-bearing strata below. Water piped up from the gravel strata through the cylinder flowed to ten log troughs. Additional troughs were blasted out of sandstone.\textsuperscript{40}

Another major water development project was the Cisco Spring pipeline constructed by the Dalton Wells camp. Utilizing available drought-relief funds, crews spent nearly 4,000 man-days and $8,601 in materials building a pipeline to carry water seven miles across dry range-land. A special thirty-five-man spike camp located sixty-five miles from the main camp at Dalton Wells built the pipeline. To develop Painter Springs in western Millard County, crews from the Antelope Springs camp trucked in thirty-five miles in sub-zero weather. Fifty sheep outfits, running a total of 75,000 head, benefited.\textsuperscript{41}

The land of Utah has always been difficult to conquer. As the CCC struggled to overcome the inhospitable terrain and unruly climate, nature occasionally threw hordes of animal and insect pests into the fray. The so-called Mormon crickets had plagued Utahns since pioneer days in the 1840s; they proved troublesome again in the mid-1930s. In late 1935 residents of little Scipio in eastern Millard County reported seeing clouds of crickets descend upon the area from the northwest. The Forest Service, CCC crews, WPA workers, and farmers battled the insects all through 1936, but the traditional methods of spraying poison dust, burning with gasoline, even pasturing turkeys failed to do any good. In the spring of 1937 the crickets still ran the scene.\textsuperscript{42}


\textsuperscript{42} Eureka Reporter, April 8 and 15, 1937.
Crickets also hit the Uintah Basin. A spike camp of twenty men from the Vernal camp was assigned to work on cricket control. Using bells and other noisemakers to attract the crickets, the men then sprayed them with a powder of arsenic and lime. Crews also burned sagebrush across the path of the insects in an attempt to destroy them. Still another method was to erect galvanized iron sheets ten inches high across the crickets’ line of march. Gaps left in the barricade led into deep pits. Upon falling in, the cannibalistic insects began devouring each other. At the conclusion of the orgy, the pits were filled with dirt. In this manner over 250 bushels of crickets were eliminated and hopes were high that the infested area would see the problem eliminated in another year.43

At Clover Creek, CCC crews worked with farmers in constructing the ten-inch fences which ran 500 feet on either side of the pits. Perhaps unwilling to trust the crickets’ cannibalism, workers then set the pits afire and reported a successful kill.44 During the same period a twenty-five man spike camp from Antelope Springs was stationed near Oak City to battle the pests. Pictures from the Division of Grazing report of the period show how the five-man crews dusted the crickets with poisonous arsenic. Wearing a handkerchief over his mouth and nose and with his pants legs tied at the ankle, an enrollee would venture into the field armed with a back-pump operated by a lever worked with his right hand. In licking the annoying powder off their legs the crickets would take the arsenic into their stomachs. Death soon followed.45

Even more time-consuming was the battle against burrowing rodents. A honeycomb of tunnels could make the ground surface unsafe for a galloping horse. Holes were equally hazardous, and the excavated dirt covered up valuable grass. Burrowing pests also attacked the sides of roads and reservoirs. Even more serious was the loss of vegetation as a result of the eating habits of the animals. Thirty-two ground squirrels could eat as much as one 120-pound sheep. The same amount of grass could be consumed by twelve jack rabbits or twenty-five prairie dogs or pocket gophers.46 As grasses disappeared from the rangeland, unpalatable bush varieties came in to take their place. The rodents constituted a health menace as well, since the prairie dogs occasionally carried

43 Vernal Express, June 18, 1936; Vernal Express-Roosevelt Standard (special edition), August 6, 1936.
46 E. Scott Zimmerman, “Rodent Control — A Seasonal Project,” The Utah Farmer, April 10, 1934, 1.
bubonic plague and rabbits carried tularemia, both of which may be transmitted to man.\textsuperscript{47}

Rock chucks, kangaroo rats, and deer mice also troubled the stockman. To combat the rising menace, thought to be due to the decrease in the natural enemies of the pests, Director Robert Fechner announced on April 8, 1936, that an intensive program of rodent control would be carried out by the CCC. The Vernal camp conducted one of the most active campaigns against the little animals. Normally CCC crews of the Division of Grazing worked only on government land, but, in some instances special concessions permitted adjacent private lands to be treated by the CCC with the cooperation of the landowners. In the Uintah Basin the CCC used poisoned grain as its chief weapon. Here, a rodent control crew consisted of twelve men who would treat rolled oats with strychnine and place a few grains on hard surfaces near the holes or along regular paths to apparent feeding grounds. Enrollees spread the grain carefully to prevent livestock from getting poisoned. They soon learned that it was useless to put grain down the holes as the animals got suspicious of food so easily obtained and it quickly went to waste. By early June 1936, Vernal crews had treated over 1,500 acres with a 90 percent kill of prairie dogs, kangaroo rats, and deer mice. Another project later that same summer resulted in the treatment of 5,580 acres and the death of 111,000 prairie dogs.\textsuperscript{48}

The CCC carried on vigorous campaigns against plant pests as well. Cedar City enrollees grubbed out and burned huge piles of poison milk weed and silky lupine while clearing stock trails. Men from the Jericho camp worked on larkspur control to rid rangeland of the poisonous weed and also cleared cockleburs from the driveway between Salt Lake City and Grantsville just before the annual drive to the winter range. The Blanding camp cleared 306 acres of burrs during one six-month period.\textsuperscript{49}

After reclaiming good rangeland from plant and animal pests, it was also necessary to see that man himself did not abuse it. Under the provisions of the Taylor Grazing Act of 1934, ranchers were restricted in the number of livestock they could run on a particular area. The Division of Grazing took the responsibility for enforcement of these restric-

\textsuperscript{47} Seventh Period Report, DG–34, September 30, 1936.

\textsuperscript{48} Vernal Express, May 21, 28, June 4, August 20, 1936. The campaign against prairie dogs and rock chucks continued for at least the following two summers, ibid., September 16, 1937, July 14, 1938.

tions, and the CCC erected drift fences to ease the work of range control. During the first few years of the program, the Utah camps averaged 140 miles of fence-building a year; the figures increased somewhat beginning in 1939 and the over-all average reached 230 miles a year, or a total of 2,069 miles of fence.

Beginning in 1939, the CCC camps — especially those under the Division of Grazing — commenced a vast program of reseeding the rangeland denuded by rodents, erosion, or overgrazing. Of the 214,290 acres eventually reseeded in Utah, approximately one-third received treatment during the twelve months ending in June 1940.\textsuperscript{50} The Hanksville camp carried on what was described as the largest single project in that particular area. After 8,000 acres had already been reseeded, preparations proceeded for the reseeding of another 10,000 acres with a mixture of crested wheat grass, rice grass, clover, and rye. First, seed was scattered over the land, about four pounds per acre. Next, a tractor pulling a disc harrow followed to cover the seeds and scarify the land with contour-following trenches. Seed money came from the so-called twenty five percent fund which came out of the grazing district’s share of fees paid by range users.\textsuperscript{51}

With water holes and stock trails provided, with successful inroads against nuisances ranging from cockleburr to ground squirrels, and with attempts under way to revitalize the rangeland with new strains of grasses, the Utah stockman had ample reason to bless the CCC. The construction of twenty to thirty corrals throughout the state each year was an added benefit. The Goshen cattle corral east of Eureka was a typical cooperative venture. Local stockmen provided the hardware and

\textsuperscript{50} Reports of the Director, 1940, 1942.
\textsuperscript{51} Richfield Reaper, October 16, 1941.
lumber for the gates and chutes; aspen poles came from the Forest Service; the scale, lumber, cement, and other materials came from the State Road Commission; CCC enrollees under the Division of Grazing did the work. The Union Pacific Railroad also aided in construction by donating old railroad ties for building corrals.  

Serious contenders for the title of major CCC project in Utah would have to include those completed by the Bureau of Reclamation — especially the Moon Lake Project, Pine View Dam, and the Provo River Project. The Bureau of Reclamation first became involved with the CCC program in 1934 when nine camps sprang up during the third enrollment period. Two camps assigned to Utah worked on canal-building projects in Wasatch and Sanpete counties during that first summer. In October of that year, both camps transferred: Company 1968 to Bridgeland, and Company 1967 to Huntsville.

The Moon Lake Project developed in the Uintah Basin of northeastern Utah north of the Duchesne River and west of the Uintah River. The Bureau of Reclamation became interested in the project in 1927, less than a quarter of a century after white settlers moved into the region. The bureau conducted an investigation in cooperation with the Utah Water Storage Commission and submitted a report to the federal government in 1933. Funds for construction were allotted November 29, 1933, and President Roosevelt approved the Moon Lake Project November 6, 1935.  

The work was divided into two parts. Under private contract, a San Francisco construction firm built the Moon Lake Dam on the west branch of the Lake Fork River. The balance of the facilities — the Yellowstone Feeder Canal, the Midview Dam, the Midview Lateral, and the Duchesne Feeder Canal — were built by the CCC between 1934 and 1941 under the general supervision of E. O. Larson, engineer for the Bureau of Reclamation in Utah.  

The Midview Dam was dedicated on September 10, 1937, in a ceremony attended by Congressman Abe Murdock and officials from Fort Douglas, the Bureau of Reclamation, and the surrounding area. The enrollees of Company 1968 saw to it that the reservoir received the name

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52 Ninth Period Report, DG-26, September 30, 1937; Eureka Reporter, June 3, August 12, 1937.
54 Ibid. Today, the project can provide water to over 75,000 acres, and farmers in the Uintah Basin annually harvest irrigated crops worth between one and two million dollars.
Lake Bauram in honor of Charles L. "Chip" Bauram, killed while changing the blade on a bulldozer during construction of the dam in February 1936.\textsuperscript{55} Work on the various canals continued as late as 1941.

The CCC was also involved with the Pine View Dam and the Ogden River Project. Enrollees participated in nearly all the activities except the construction of the dam itself which was built by two private firms. The enrollees performed many odd jobs not covered by the contract including sloping of embankments, bridging Wheeler Creek where it enters Ogden River just below the dam, and doing some riprapping. Other work carried on by CCC personnel included constructing stream gauging stations to determine water flow, building drains along the highway, and widening the highway in the canyon to provide viewing areas of the lake and to make snow removal easier.

One of the most unusual aspects of the project was the dismantling of an old seventy-two inch pipeline running the length of the canyon below the dam and replacing it with a seventy-five inch pipeline built of wooden staves. This Ogden Canyon Conduit carried the water about five miles from a dam outlet to two canals that branched north and south from the mouth of the canyon. When a CCC inspector saw the hazardous work the enrollees did along the wall of the canyon, he threatened to take them off the job before they all got killed. Supervising Engineer E. O. Larson replied, "Don't do that; they're nine-tenths done and nobody got hurt yet!"\textsuperscript{56}

Considerable canal construction advanced in connection with the dam. The South Ogden Highline Canal extended seven miles from the mouth of the canyon along the edge of the mountains to the southwest; the Ogden-Brigham Canal was constructed to take irrigation water from the canyon mouth twenty-five miles north to Box Elder County. These two projects were virtually completed by 1938.\textsuperscript{57} Over the next three years enrollees built distribution laterals and concrete-lined equaliz-
ing reservoirs; they lined canals with concrete; they even removed part of the Ogden-Brigham Canal and rebuilt it. As the numbers of enrollees declined in 1941 other laborers were brought in and the work ended that summer.58

CCC crews were also involved with the Provo River Project after a camp was set up in Heber in December 1937. Another camp, also under Bureau of Reclamation supervision, was established at Pleasant Grove just under two years later. The project consisted of the Deer Creek Dam and a reservoir on the Provo River about sixteen miles upstream from Provo, dams, tunnels, and canals to bring water from the Weber and Duchesne rivers into the reservoir, a forty-two mile aqueduct from the reservoir to Salt Lake City and various distributing canals. The purpose of the latter was the distribution of domestic and irrigation water for the cities and farms between Salt Lake City and Provo.59

The first year that Company 4792 resided in Heber, enrollees constructed the Deer Creek government camp near the dam site as residences and offices for the construction personnel. They also began work on a bridge across Round Valley Creek and installed some culverts and guard rails. When they could be spared from other tasks, enrollees cleared the reservoir site, burning willows and bushes and salvaging several buildings and the phone line. By the end of 1939, the reservoir clearing stood about sixty percent complete.60

The development of the reservoir necessitated the relocation of several structures, providing the enrollees with the opportunity of developing a variety of skills. The Denver and Rio Grande Railroad moved its tracks; nearby, enrollees strung sixteen miles of five-wire barbed wire fence, built seven timber road crossings, and fourteen cattle guards along the new right-of-way. At Charleston enrollees built the only CCC-constructed railroad depot in Utah and built loading pens and corrals. They also relocated about nine miles of telegraph line under supervision of Western Union personnel. Since the highway between Charleston and Midway ran a few feet below the ultimate water level of the reservoir, 3,200 feet of roadway had to be relocated. In 1939 they dismantled a 100-foot bridge and reconstructed it on concrete pillars to serve the new

58 History, Ogden River Project, 9:37. The facilities were subsequently enlarged under the Weber Basin Project development from 1955 to 1957. Nearly 163,000 persons were served with project water the following year. “Ogden River Project,” 562.
Work began to taper off in 1941, and on August 20 the camp in Pleasant Grove disbanded. The Heber camp continued doing odd jobs around the dam until it closed down in July 25, 1942, one of the last CCC camps to exist in Utah.62

The CCC worked on other reclamation projects in the state, although none of the magnitude of the Moon Lake, Pine View, or Deer Creek projects. In 1941 the Bureau of Reclamation hoped to get CCC forces for work in the area of the Gooseberry Reservoir and on the proposed Scofield Dam. Inspectors from Fort Douglas looked over various sites and in May announced that two new camps would be established: one in Sanpete County near Fairview and the other near Scofield in Carbon County. It was too late in the life of the CCC, however, and the projects never materialized.63

Bureau of Reclamation projects were among the most significant to be attempted in Utah. Project engineers supervised every aspect of the work and CCC men carried it out to strict specifications. Those associated with the direction of the projects spoke highly of the work of the enrollees and the director’s reports indicated official CCC satisfaction with their efforts. In addition to commenting on the assistance being given the Bureau of Reclamation, the director stated that “The enrollees have acquired a reputation for building sound and permanent structures, durability being the objective of all CCC construction on reclamation projects.”64

Most of the work done by the CCC proved much less demanding, even monotonous. Some of it was dangerous. Some even may have been hastily planned and poorly directed as critics and a few former participants have claimed. Deterioration has no doubt taken place. A quality analysis would be impossible to determine, but over the years the work has been regarded as being of generally high standard and the projects themselves most worthwhile. Certainly many projects were carried out that could never have been attempted without the infusion of CCC funds and labor. K. C. Balcomb, regional CCC administrator for the Soil Conservation Service, described the accomplishments of his agency as follows: “If one Utahn was to do the erosion-control work of the state’s SCS camps over one year, he would have to work every day including

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62 Ibid., 7:25. The Salt Lake Aqueduct and the Deer Creek powerhouse, now integral parts of the Deer Creek Project, were not constructed until the 1950s, “Provo River Project,” 615.
63 The Salt Lake Tribune, April 4, 1941; Vernal Express, May 1, 1941.
64 Report of the Director, 1940, 42.
Sunday for 643 years; if a crew of twenty men tried to accomplish the work done by the SCS between 1935 and 1941 it would take 104 years.65 At no time since the 1930s have the Forest Service, Park Service, and other technical agencies had the opportunity to carry out planned projects on such a scale. Fortunately, most of the agencies had had long-range plans prepared so that when the CCC got underway there was little boondoggling or featherbedding.

Analysis of the financial value of the projects is difficult. The value of crops irrigated by the reclamation projects in which the CCC participated would total nearly $8 million a year for the past thirty-odd years. The difficulty arises, of course, in attempting to determine the relationship between the existence of the CCC and the completion of the project. Some of the projects would have been completed anyway; others would not. The Midview Dam, for example, was built entirely with CCC labor and reports at the time indicate that construction would not have been planned then had CCC labor not been available. The Moon Lake Dam, on the other hand, would have gone ahead in either case. The Pine View and Deer Creek projects were done primarily by bureau or contract forces and the CCC did only the accompanying tasks necessary to implement the use of the dams. Had the corps not existed the work would have been accomplished, but probably at greater cost. The terracing projects of the Forest Service are another matter. The Forest Service did not receive budgetary considerations comparable to the Bureau of Reclamation. The tangible benefits of a dam attract more support and financial assistance than the somewhat intangible prospect of a downpour which might take place at some vague time in the future. Had the CCC not been in existence it is unlikely that sufficient state or local monies would have been available to carry out the erosion-control projects, even in make-work situations that might have been part of a state relief program.

The conservation and reclamation work of the CCC between 1933 and 1941 can be quantitatively measured in terms of the 423 dams that were constructed, the 792 springs, water-holes, and small reservoirs the enrollees developed, or the 5,231 miles of terracing that were excavated. The Federal Security Agency has estimated the CCC spent $52,756,183 in Utah.66 Difficulty arises, however, in calculating the cost of a flood that did not occur because of CCC terracing work or of a rampaging river

65 Kane County Standard (Kanab, Utah), October 23, 1941.
66 U.S., Civilian Conservation Corps, "Total Work Completed During the Period — April, 1933 to June 30, 1942, Utah."
kept within its channel due to rock and concrete embankments constructed by enrollees from New Jersey, Ohio, or Salt Lake City. The monuments to the Civilian Conservation Corps may be found throughout the state: the riprapping along the Virgin River, Lake Bauram, the bridge over the San Rafael Wash, the campgrounds up Logan Canyon, the rodeo grounds at Tooele, the Bear River Bird Refuge, the terracing overlooking Willard and Bountiful, and the dozens of reservoirs and springs on the western desert. That those accomplishments represent a "great leap forward" in the area of reclamation in Utah that may never be repeated is contemplated by conservationists with considerable foreboding.

SHEEPHERDING IN WINTER

On the 31st day of December the same year 1886. I left my newly acquired home and went to heard sheep for Al. Hatch and Thomas Karren I was to have $3700 dollars a month and my board. My wife managed to keep her self and Four children on what was left of my wages, after I had bought my shoes and my tobacco. I stayed with it for about 13 months, it then being the latter part of January 1888: The snow was quite deep during the winter of 1887.-1888, and it was extremely cold. During January the thermometer registered as low as 40 below zero for several days. That same winter I was blessed with a partner by the name of James Hunting. One of those extremely cold days, we failed to get the sheep into camp that evening. They bunched up on us and we had to leave them when it got dark on us, so we started out for camp with out them. The snow was about a foot deep and it was crusted quite hard but not hard enough to hold us up. When we got within a half mile of camp, I had to sit down and I told Jim that I could go no farther until I had rested for awhile. . . . I quit herding afew days after that. I rented a farm from Jim Henry, that was situated just South west of Vernal. ("The life History of our Father. John Nielsen," compiled by May Nielsen Andersen, typescript, Utah State Historical Society, 59-61)
Tunnel looking toward portal 1,200 feet away. Utah State Historical Society, gift of Mrs. Lewis M. Hammond and Engineers Society of Milwaukee.

An Investment in Progress:
Utah's First Federal Reclamation Project,
The Strawberry Valley Project

BY THOMAS G. ALEXANDER

In the area west of the 100th meridian, water rather than land has controlled development. As Arizona Delegate Marcus Aurelius Smith observed in the debates over the appropriation of money for the Powell Irrigation Survey in 1890, anyone in the West might take an almost un-
limited area of land covered by sagebrush, cactus, and thistles and do “himself no good nor others any harm.” ¹ Though irrigation had gone ahead on the public lands without federal authorization, it was not until 1866 that Congress recognized its need by granting land for rights-of-way for ditches and canals.² After much pressure, Congress followed this with the Desert Land Act of 1877 which allowed 640 acres to anyone who could water it, and the General Revision Act of 1890 which limited acquisitions to 320 acres.³

Not until 1888 did western groups place sufficient pressure on the federal government to secure action on the problem of irrigation. Before this time, the government had published the famous Report on the Lands of the Arid Region by John Wesley Powell in 1878 and a study of irrigation practices by Richard J. Hinton in 1886.⁴ In 1888, Senators William M. Stewart of Nevada and Henry M. Teller of Colorado secured approval of a resolution calling upon the secretary of the interior to report on the feasibility of an investigation to determine the water resources of the arid west. Congress then authorized the Irrigation Survey under Powell’s direction, and Stewart headed a committee to report on the need for reclamation in the arid West.⁵

Before the 1890s irrigation was accomplished on an individual and corporate basis. Beginning in 1886, however, Joseph M. Carey, delegate and later senator from Wyoming, sponsored bills to turn lands over to

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² 14 U.S., Statutes at Large, 251.

³ 17 U.S., Statutes at Large, 622; 26 U.S., Statutes at Large, 391.


states for irrigation development. In 1894, the proposal finally became law as a rider to the Sundry Civil Appropriations bill. The act provided that any state could secure up to a million acres if it would reclaim the land and settle it in quarter section plots. The act was not very successful and ultimately states developed only about 1.1 million acres under its provisions.

By 1900 it had become obvious that private enterprise did not have the resources to finance the irrigation of large sections of America’s arid lands. In that year, the platforms of both major parties called for federal support of reclamation projects. Secretary of Agriculture James Wilson, President Theodore Roosevelt, Representative and later Senator Francis G. Newlands of Nevada, and George H. Maxwell of the National Irrigation Association all worked for enabling legislation. Newlands got Frederick Haynes Newell of the Geological Survey, who had earlier worked with the Irrigation Survey, to draft a reclamation bill and House and Senate committees held hearings on the proposal early in 1901. After the death of President William McKinley on September 14, 1901, President Theodore Roosevelt put the prestige of his office behind the proposal.

In Congress, the principal opposition to the reclamation bill came on the question of its constitutionality. Supporters observed, however, that the federal government had already taken money from general revenues to dredge rivers and harbors and construct works for flood control. If such undertakings were constitutional, they asked, how could irrigation works be illegal when financed from funds derived from sales of public lands to farmers. Some supporters, such as Senators Teller and Benjamin F. (Pitchfork Ben) Tillman of South Carolina, argued that the government ought to, in fact, take money from general revenues for the projects. Senator Stewart said that even the repayment of construction costs would not be the principal return to the government, but that increased business would more than repay the investment.

Major opposition in the House came from eastern and midwestern congressmen who feared that increased cultivation of lands would lower farm prices and exacerbate local farm problems. Had this argument been accepted earlier, supporters argued, there would have been no

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*29 U.S., Statutes at Large, 413.
7 Schad and Rose, 4.
8 Ibid., 5–7; George Warton James, Reclaiming the Arid West: The Story of the United States Reclamation Service (New York, 1917), 14–17.
9 Schad and Rose, 7–8.
reason for the United States to have opened lands beyond the Appalachian Mountains. The westerners received the support of some eastern manufacturing interests who wanted to establish commercial contacts for their products. The act passed June 17, 1902.\textsuperscript{10}

Soon after the passage of the Newlands Act, citizens of various western states began to lobby for federal funds for reclamation projects. About 1900, State Senator Henry Gardner of Spanish Fork and his friend John S. Lewis, while visiting the Strawberry Valley in the Green River Basin on a summer outing, conceived the idea of building a reservoir to store water on the east side of the Wasatch Mountains which could be transferred through a tunnel to the Great Basin. As early as 1851, Mormon pioneers had diverted the Spanish Fork River and other smaller streams to irrigate lands in southern Utah Valley, but these streams depended upon water released from seasonal snowfall and were not always reliable. As a result, farmers had to restrict their crops to those maturing early and not requiring intensive watering during the late summer.\textsuperscript{11}

In 1902, the Spanish Fork East Bench Irrigation and Manufacturing Company, and promoters including Senator Gardner and others from Spanish Fork and Payson, undertook preliminary investigations. The group employed an engineer to examine both the project and water rights on the Strawberry and the Spanish Fork rivers. The engineer reported that the project would be so expensive that neither a small company nor individual citizens from Utah Valley could complete it without outside aid. In January 1903, therefore, the group organized a committee to request an investigation by the newly-established federal Reclamation Service.\textsuperscript{12}

The Reclamation Service investigated the situation in 1903 and 1904, and in January 1905 approximately 1,200 citizens owning more than 26,000 acres of land petitioned Frederick Haynes Newell, who had since been appointed head of the service, for a federal irrigation project. The investigations showed that 50,000 acres of land south and east of Utah Lake currently under private ownership were partly irrigated. When the farmers had water, the land was very productive, but the old

\textsuperscript{10} Schad and Rose, 8–9; James, 16.
\textsuperscript{11} U.S., Department of the Interior, Bureau of Reclamation, \textit{Reclamation Accomplishments: Strawberry Valley Project, Utah} (Salt Lake City, 1955), 5. Hereafter cited as \textit{Reclamation Accomplishments}.
canals which served the lands did not reach bench lands which might have produced bountiful crops if sufficient water had been available. The seasonal runoff made about 57,200 acre-feet of water from the Spanish Fork River, Hobble Creek, and Payson Creek available, mainly in May and early June. The report showed that the project could supply an additional 50,000 acre-feet at least half of which could be stored until July and August. An additional argument for the feasibility of the project came from the fact that two railroads provided excellent access to markets for the increased products of the valley.

Thus emerged plans for the first large scale diversion of water from the Colorado River Basin into the Great Basin. In August and October 1905, two boards of engineers recommended authorization of the project and on December 15, 1905, Secretary of the Interior Ethan A. Hitchcock authorized the project and set aside $150,000 from the reclamation fund to begin work.

The preliminary investigations had already determined the scope of the project. By early September 1904, E. F. Tabor, assistant engineer in charge of reconnaissance, had submitted a preliminary report on the feasibility of diverting tributaries of the Duchesne River to Utah Valley. A compass-stadia line approximately on grade contour determined that a canal from the Strawberry River, in order to contact other streams, would have had to follow a 190-mile course to cover 50 air miles. The most efficient system, the bureau engineers believed, would divert water only from the Strawberry River. The project itself would consist of diversion works and a reservoir on the Colorado River side of the Wasatch Mountains and a tunnel through the mountain to divert the water into the Diamond Fork of the Spanish Fork River and thence into southern Utah Valley.

To facilitate construction of the tunnel and reservoir, the bureau built roads and other service facilities at various project sites. The main road from Diamond Switch, the government forwarding point on the Denver and Rio Grande thirty-two miles from the proposed west portal of the tunnel, was constructed between early March and late October 1906. Most of the workmen were water users who were anxious to get the precious fluid. Although government engineers expected that the

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road, when completed, would be a shorter and better route for settlers from central Utah to the recently opened Uintah Indian Reservation in eastern Utah, conditions on the road were so bad that it was impassable during the winter and early spring by any but light buggies. The road was continued from the west portal to the proposed dam site. Additional roads were constructed to maintain project facilities. Between 1910 and 1916 about twenty-five miles of wagon roads were built to connect various project features. By 1916 it was possible to drive completely around the reservoir. Along Diamond Fork Creek, four light wagon bridges were constructed to permit land owners to cross when water was turned into the stream.¹⁶

At Diamond Switch, the government leased land and constructed buildings. The Rio Grande Company laid a siding and the government put up three large storehouses, a stable for twenty-four horses, and several houses for employees. Telephone wires were strung from Spanish Fork by way of Diamond Switch to both portals of the tunnel.¹⁷

As work progressed on the roads, the power plant was constructed. On December 4, 1906, the bureau authorized construction of three miles of power canal together with settling basins, and other structures to carry 500 second-feet of water from the Spanish Fork River to the Upper Spanish Fork Power Plant in Spanish Fork Canyon. Though local companies entered bids, General Electric Company won the contract for electrical machinery for $26,119, and the Dayton Globe Iron Works submitted the low bid of $12,500 for the turbines.¹⁸

Though the principal purpose of the power plant was to furnish electricity for the construction of the tunnel and other project features, during October and November 1909, a three and one-half mile transmission line was constructed from the power house to Spanish Fork to supply electric current for lighting and other purposes. By 1914 power was being furnished on a contract basis to Payson, Salem, and Spanish Fork. In 1918, the government erected a 5.3 mile high-tension line to the south boundary of Springville to furnish power to that city. Two subsidiary power plants, operated by the water users association, were opened in 1937 and 1941.¹⁹

¹⁷Ibid., 1907, 216 and 222.
¹⁸Ibid., 1907, 215–220; 1909, 185.
After the government had begun construction of some of these auxiliary structures, it began work in August 1906 on the key feature of the project which was the 19,500-foot concrete lined tunnel from the reservoir to the head of Diamond Fork. The government was unsuccessful in securing private bids for the tunnel work, and work was commenced from the west portal by a bureau-supervised labor force. At first, gasoline engines supplied power to electric rock drills, but after the power plant was completed in late 1909 power was made available from that source. With the increased power, the government brought in additional electrical equipment such as electric locomotives for pulling the loads of muck and an electrically driven ventilating blower. In October 1911, a year after the work of lining the tunnel with concrete had begun, workmen began to push westward from the east portal. On the morning of June 20, 1912, the two crews met, and in 1913 crews poured the last of the concrete lining. An estimated 10,000 people attended festivities in Spanish Fork on July 2, 1912, to celebrate the completion of digging the tunnel. On September 13, 1913, the gates at the east portal were raised for the first time and water was allowed to pass through the tunnel to clean out accumulated debris. The first irrigation water was turned through the tunnel on June 27, 1915.

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20 Bureau of Reclamation Report, 1905, 332; 1906, 278.
21 Ibid., 1907, 216-17; 1908, 186; 1909, 185; 1910, 270; 1911, 218; 1912, 172; 1913, 214; 1914, 272-73; 1916, 409. Provo Herald June 21 and July 12, 1912.
It was thought at first that it might be necessary to construct a new distribution system for the Spanish Fork area, but, though the existing system was not completely satisfactory, the engineers decided to leave it as it was and to construct additional canals to supply newly opened lands. In 1908 a preliminary survey and a cost estimate were made for a highline canal which was to extend from the power canal around the foot of the mountains to Payson Creek. Contract construction on this unit was begun during fiscal year 1915. To prevent excessive seepage, it was necessary to line about five miles of the main canal and almost all of the laterals with concrete. On this phase of the project, the contractor employed about 800 men and 400 head of stock. The government forces, including engineers and inspectors, comprised about 125 men and 30 head of horses. By early 1916 the canal had been completed, and on April 7, 1916, the Strawberry High Line Canal Company Water Users’ Association entered into a contract with the bureau whereby it took over operation and maintenance of the unit. The company agreed to repair the facilities and deliver water to each of the users or to allow the government to repair the works and to reimburse it for its efforts.\textsuperscript{22}

In 1918, work was begun on the Mapleton-Springville canal which stretched north 6.7 miles almost to Hobble Creek. In addition to the canal, the project consisted of headgates, a line over the Spanish Fork River, and a concrete siphon under the Denver & Rio Grande Western tracks. By 1921, the government was capable of delivering 69,100 acre-feet of stored water to the system which included the government constructed Highline Division and Springville-Mapleton Division and the existing Spanish Fork canal companies.\textsuperscript{23}

As early as April 1913 as the bureau pushed the tunnel to completion, residents of Juab County and southern Utah Valley began agitating for inclusion in the project. Engineers from the project told a mass meeting at the Juab County Court House in Nephi of the possibility of diverting water adequate for 10,000 to 15,000 acres into that water-starved region. Residents pledged money to meet the costs of a preliminary study. In 1917, settlers near Goshen and Elberta, in southern Utah County, asked for an extension of the Strawberry Valley Project to include water for them. In 1919, negotiations were opened with settlers near Mona and Nephi in Juab County for a possible highline lateral, and a preliminary survey was undertaken looking to the possibility of the construction

\textsuperscript{22} Bureau of Reclamation Report, 1905, 333; 1908, 186; 1915, 267; 1916, 410–414.
\textsuperscript{23} Ibid., 1918, 312; 1919, 318; 1921, 372. For engineering statistics on the structures see Reclamation Project Data, 728–29.
of a forty-five-mile lateral with a capacity of 150 to 200 second-feet. None of the proposed extensions was made at the time, and the Republican administrations of the 1920s, with their financial conservatism, did not undertake them. The Bureau of Reclamation's Central Utah Project which is currently (1968) being constructed will supply these areas and others further south with transmontane water.24

As the storage unit on the project, the bureau planned to construct a dam forty-five feet in height to retain a capacity of 100,000 acre-feet. But before the construction of the dam actually began in 1911, the height of the dam was changed to seventy-one feet, which gave the reservoir a capacity of 298,000 acre-feet. The dam was a loose rock structure with a concrete core wall backed by earth. The bureau asked for bids, but as with the tunnel, no bids were received and the work was done by the bureau's labor force. Actual work on the dam was begun on June 18, 1911, when the Strawberry River was diverted through a sluicing tunnel. Storing of water in the reservoir began July 14, 1912, riprapping was completed September 20, 1913, and work on the concrete-lined wasteway was finished May 25, 1917.25

After work on the dam was completed, workmen noted that seepage through the dam face increased after water had risen to 7,550 feet. Engineers decided to cover the surface with a clay blanket to cut off seepage. This was done in the summer of 1916.26

To prevent water from flowing across a saddle to the south of the reservoir and to collect water from Indian and Trail Hollow creeks, plans were laid for the construction of the Indian Creek and Trail Hollow Diversion Canal and the Indian Creek Dike. Construction on the thirty-seven-foot dike began by contract in 1911 and was completed in September 1912. The diversion canal was completed a year later. In 1934 a feeder canal of 4.7 miles was constructed from Currant Creek, about fourteen miles north of the east portal in a southerly direction, to Co-op Creek which flowed into the Strawberry Reservoir. It was completed in 1936.27

24 Bureau of Reclamation Report, 1917, 287; 1918, 213; 1919, 218; 1921, 325; Provo Herald, April 23, 1913.
25 Bureau of Reclamation Report, 1905, 332; 1907, 215; 1912, 172; 1913, 214; 1911, 217; 1906, 271; 1914, 272; 1917, 238. Of the 298,000 acre-feet of water in the reservoir, 286,000 acre-feet are available for use and 12,000 acre-feet are below the base of the tunnel. Interview with Arthur W. Finley, president of the Strawberry Valley Water Users Association, January 27, 1969.
26 Bureau of Reclamation Report, 1917, 238.
27 Ibid., 1911, 219; 1912, 172; 1913, 214; 1914, 272; Reclamation Project Data, 731.
Work on the Strawberry Valley Project was anything but easy. Some idea of the difficulty of doing winter work on the project can be gathered from the burden of working in eighteen inches of snow which fell at the project site in one week of February 1912. In January 1909, ninety-one inches of snow fell at the project and on January 20 the freight road from Diamond Switch to the tunnel was blocked with snow. Yet, in spite of the heavy snow, the power plant operated continuously and two shifts worked at the tunnel. Transportation from the railroad to the project and back could only be accomplished by sleigh during the long winters. Fortunately, or unfortunately, depending on the point of view, the most serious accident on the project occurred in summer when W. B. Lancaster became entangled in a cement mixer. He had to be taken to the Provo Hospital for treatment of a fractured skull, broken left leg and broken jaw.28

As the project continued, other difficulties impeded progress. Wages ranging from $2.25 for laborers and $3.00 to $3.25 per eight-hour day for foremen and carpenters, in the fall of 1911, were insufficient to entice enough workmen to either the tunnel or the Indian Creek Dike project. Work had to slow down as a shortage of labor ensued. In May 1911, workmen in the tunnel encountered a constant flow of underground water averaging six to seven second-feet. To cope with the problem, they constructed a plank platform under which the water was diverted.29

In 1915, operation and maintenance of the facilities began. A ditchrider and gate tender took care of the storage works and a ditchrider inspected the Spanish Fork Diversion Dam and power canal. In 1918, swellings were noticed on the face of the dam, and a gang of twenty-four men put timber sets at four different places to strengthen the sides. During the First World War, guards were placed at the dam site to protect it from saboteurs. In 1920, bureau employees laid tile at the foot of the dam to conduct seepage away and prevent accumulation of backwater. Considerable repair was necessary on the Diamond Fork Road to permit use of the road while the creek was wearing a new channel. In 1922, some 2,800 linear feet of floor were placed in the tunnel. The project was declared complete on June 30, 1922, and in 1926 the water users assumed control of the project.30

29Provo Herald, January 3, 1909; and May 12, September 28, October 3, and December 5, 1911.
30Bureau of Reclamation Report, 1919, 318; 1920, 343-44; 1924, 73; Reclamation Project Data, 729; Reclamation Accomplishments, 7, 9; “Strawberry Valley Project, Utah,” Reclamation Record, 13 (February, 1922), 36.
Beyond delivering water and power to the residents of the Strawberry Valley Project area the Bureau of Reclamation performed other services. Bureau engineers made plane table surveys of irrigable land to study existing conditions and plan the best use of distribution systems. Studies were also made to determine the probable water consumption of various lands and the character and extent of crops which could be raised. Subsidiary investigations were made to determine the possible sites for further development of hydroelectric power. Flow records were made of all streams and investigations were undertaken into seepage and drainage from lands on the project. Farm unit surveys were made to classify various lands on the project. In addition, the Bureau of Reclamation aided the state in keeping cooperative weather reports at Provo, Spanish Fork, and the east portal of the tunnel.\(^{31}\)

The service which the government performed in drainage was of considerable help to farmers on the project. In 1913, it was reported that, owing to the high level of the water table, numerous areas near Utah Lake were unfit for cultivation. In 1918, investigations were undertaken to determine what action could be taken to form drainage districts. In 1919, owners of land in the project petitioned the government to investigate the situation, and the bureau’s Denver office sent a drainage engineer. On the basis of these investigations, by mid-1921 farmers had organized five drainage districts in the project area.\(^{32}\)

Some advantages accrued to the government itself through the project owing to the greater efficiency which it found in the experimental use of automobiles. In 1917, two autos were in use on the project and two more had been ordered. Studies determined that the cars could be operated for an average cost of 8.4 cents per mile. By using automobiles for hydrographic and inspection work an engineer and an assistant could cover distances varying from 50 to 100 miles per day. With a team and driver, only 25 miles could be covered at an average cost of 18 cents per mile.\(^{33}\)

A major difficulty which the bureau had to overcome before the project could be successful was the satisfaction of those with water interests in the project area. The water rights in Utah County were among the oldest in Utah, and farmers holding primary rights were apprehensive about merging their holdings with other landowners. In an attempt to

\(^{31}\) Bureau of Reclamation Report, 1906, 272; 1908, 186; 1909, 185; 1912, 173; 1913, 215; 1914, 273; 1915, 267; 1917, 284; 1918, 313; 1919, 218, 320.

\(^{32}\) Ibid., 1913, 215; 1918, 316; 1919, 321; 1921, 329.

\(^{33}\) J. L. Lytel, “The Automobile on the Strawberry Valley Project,” Reclamation Record, 8 (December, 1917), 586.
unify the interests, the government tried to promote membership in the Strawberry Valley Water Users' Association. Those with vested interests, however, were fearful of trying anything new and resisted the movement.34

In 1912, Frederick Haynes Newell met with the directors of the association and tried to explain the requirements of the contract which the farmers had signed in 1906. A difference of opinion had arisen as to the apportioning of the cost of the project, particularly the rather expensive Highline Canal, which was to serve Payson. Payson water users argued that these costs should be charged to the whole project; those at Spanish Fork believed they should be borne only by that part of the project which directly benefited. The secretary of the interior gave notice that the association would be required to carry out the terms of its contract or answer a suit for breach of contract. In an attempt to resolve the conflict between the two groups and the government, Senator Reed Smoot, project engineer J. L. Lytel, and officials from Washington including C. S. Whitbeck, legal examiner for the Bureau of Reclamation, held various meetings with members of the board of directors in August 1913.35

34 Bureau of Reclamation Report, 1905, 333; 1913, 316.
35 Ibid., 1913, 216; 1914, 273–75; Provo Herald, July 31, August 18 and 21, 1913.
No definite results were reached at the meetings, so in October the secretary sent a letter to the association giving it sixty days to approve one of two propositions to adjust the water rights on the river. He proposed as a first alternative to supply water at $80 per acre plus operation and maintenance cost and to allow those with water rights a credit of $20 per acre for their existing systems. Newly irrigated land would pay the full $80. Under this arrangement, the old canals would be operated by the canal companies under the direction of the water users' association, though the bureau reserved the right to perform the maintenance if that were not done by the companies and to see that proper distribution of the water was made. The second possibility was that landowners under the old canals might subscribe to the water users' association and secure a credit of $65 per acre rather than the $20 they might receive by remaining in the old organization. After some discussion, the water users divided into two units and on December 19, 1913, they sent a letter to the secretary of the interior refusing to accept either plan. On March 25, 1914, the secretary wrote the project manager authorizing him to abrogate the contract between the government and the association.\(^36\)

Despite the difficulties, terms were eventually reached with the companies. An agreement with the highline users on the southern end of the project in 1915 gave them two acre-feet of water per acre per year at a cost of $80 per acre. In the contracts with the northern half of the project the existing water rights were not changed, but the land owners agreed to purchase water in units ranging from one-half to two acre-feet at a price of $45 per acre-foot. This arrangement allowed them credit for existing water rights and meant they only had to pay the extra charges for supplementary water. Negotiations with some of the water users were so difficult, however, that the last of the contracts was not completed until 1920.\(^37\)

Water supplied by the Strawberry Valley Project released water which had formerly filled rights on the Spanish Fork River for use on the Upper Spanish Fork, and on Soldier and Diamond Forks. Irrigation districts were formed to use the more than 800 acre-feet thus made available. In 1916, the project delivered a total of 42,928 acre-feet to the project and in 1921 the government was capable of delivering 69,100 acre-feet to the system.\(^38\)

\(^{36}\) Ibid.  
\(^{37}\) Bureau of Reclamation Report, 1914, 276; 1915, 268-76; 1917, 286-87; 315; 1916, 419; 1920, 346; Provo Herald, November 3, 1913.  
\(^{38}\) Bureau of Reclamation Report, 1916, 411, 419; James, Reclaiming the Arid West, 321–25.
A thorny problem to both the federal government and the farmers was that of repayment. The original contract, executed in 1906, provided for repayment on a graduated scale over a ten-year period. At the end of the first year $1 per acre was due. This was graduated to $5 per acre on the fifth year where it remained for the next four years. The balance of the project cost was due on the tenth year. It became abundantly clear that such a schedule was completely unrealistic, so the Reclamation Extension Act of August 1914 provided for existing projects a twenty year repayment schedule beginning at two percent for the first four years, increasing to four percent for the next two, and six percent for the next fourteen. The first annual installment was not due until the fifth calendar year after delivery of the water.\textsuperscript{39}

Repayment went along quite well under the new agreement until the depression of 1921. By mid-1922, the prices of wheat and hay had advanced slightly, but market conditions were so unsatisfactory that the water users' association took active steps to secure deferment of construction charges or to make repayment over a forty-year instead of a twenty-year period. Conditions by 1923 were still bad, as the index of farm prices paid producers for Utah crops stood at 122 as compared with 233 in 1920 (1935–39=100) and by 1925 the index still stood at the low figure of 127. As a result of these conditions, which were quite general in agriculture throughout the United States, Congress passed the Fact Finders Act of 1924, which fixed the repayment schedule at five percent of the average gross annual crop production for the preceding ten years. On the basis of this act the government entered into an agreement with the users' association in September 1926 to begin payment on a new schedule. Revenues from power and grazing contracts were used to pay the costs of operation and maintenance and additional funds from these sources were used to help pay construction costs. By January 1, 1969, the water users had repaid all but $39,361.69 of the more than $3.3 million cost of the project.\textsuperscript{40}

\textsuperscript{39} 38 U.S., Statutes at Large, 686; Bureau of Reclamation Report, 1914, 275; 1916, 574; Reclamation Accomplishments, 7; Provo Herald, December 31, 1914.

\textsuperscript{40} Bureau of Reclamation Report, 1919, 317; 1923, 108–09; "Administrative and Statistical Progress Reports for December, 1922: Strawberry Valley Project, Utah," Reclamation Record, 14 (January 1923), 43; "Contract Between the United States and the Strawberry Valley Water Users' Association," New Reclamation Era, 18 (January 1927), 8; Reclamation Accomplishments, 2; Department of Agricultural Economics of Utah State University, Utah State University, Utah Agricultural Statistics (Logan, Utah, 1963), 140. Finley interview, January 27, 1969.
Reclamation projects such as the Strawberry Valley Project have come under heavy attack from opponents of federal reclamation. They have argued that money for such projects constitutes an interest-free subsidy to project farmers and that such subsidization is not a proper function of the federal government. To be sound, they believe, total project benefits must not only exceed the total cost of the project, but it must be shown that the best use is being made of capital and resources and that the method employed is the best way to achieve a desired end. Some groups have recommended that benefits and costs be expressed only in terms of money and that estimates be, by their definition, accurate and realistic. Interests should be computed at not less than the average paid on the federal debt, and gross revenues should be based on the fair market value of commodities which are produced. In some cases, they argue, the repayment schedule is longer than the life of the project.

Opponents point out that there are sixty million acres of land in humid areas which are suitable for crop agriculture if they were properly drained and cleared. The cost of drainage on the Mississippi River Delta ranges between $8 and $25 per acre, whereas some irrigation projects have cost as much as $500 to $600 per acre. They have also argued that food and fibre requirements can be met from existing acreage until 1975. These are, of course, general criticisms, but it may be fairly regarded as the duty of the historian to determine the accuracy of such charges as they apply to actual projects. To what extent can one justify the expenditure of money on the Strawberry Valley Project?

One of the advantages claimed by proponents of reclamation has been the general economic uplift and development of depressed areas. In the Strawberry Valley Project area, population growth has been continuous while population in adjacent areas with comparable soils and climate, but without adequate water, has declined. The effect of the project on Payson alone has been notable. Between 1900 and 1905, Payson was a dying town. Population was on the decline and homes could be purchased for twenty percent of their construction cost. With the completion of the project and the introduction of water to 25,000 heretofore arid acres, Payson began to grow. By 1922, population had increased by fifty percent over the 1905 figure, bank resources had increased 1,000 percent, and a sugar factory and interurban railroad had been added. A city

waterworks, paved streets, new schools, new homes, and new churches were also new features of the city.\(^\text{42}\)

After the additional water was assured, the Utah-Idaho Sugar Company built not only the 600-ton plant at Payson, but another 1,000-ton plant at Spanish Fork. In 1918 an independent sugar company erected a 500-ton plant at Springville. In 1906 the area covered by the project produced only 1,900 acres of beets, but by 1919 14,000 acres were planted. By 1924 sugar companies were paying nearly $400,000 annually to growers on the project. Many farmers found it possible to grow beets in the summer, harvest them in the fall, work at one of the factories later, and feed stock in the winter from the beet pulp. In the mid-twenties, a large packing company opened a canning factory near Spanish Fork to take advantage of the newly available truck crops.\(^\text{43}\)

Until 1910, Juab and Sanpete counties grew at about the same rate as the area of Utah County covered by the project. In 1915, the Strawberry Valley Project delivered its first storage water to southern Utah County, and population spurted upward. In the other two areas, growth was controlled by the available water and the maximum population growth was reached between 1910 and 1915. It is true that such industries as the Ironton steel plant have located near the Strawberry Project area and helped stimulate growth, but one of the main reasons for the development of such industry has been the project itself. Water and power from the project have undoubtedly played a major part in local industrial growth.\(^\text{44}\)

Personal income associated with the project has been estimated at $18 million per year in 1955 and the impact of such income has been great. From 1950 to 1955 an average of 658 new autos, 225 new trucks, and 156 new tractors have been added annually to project farms. The annual volume of retail sales attributable to the project was more than $8 million, of which $4.5 million left the state of Utah. (The amount which left the state each year by 1955 alone was more than the entire project cost.) In 1915 the assessed property valuation in the project area was $7,476,837. By 1920 it had grown to $26,890,847. By 1955 it had

\(^{42}\) _Reclamation Accomplishments_, 2, 17; Henry Erlandson, “What the Strawberry Valley Project has done for Payson,” _Reclamation Record_, 13 (June 1922), 124.


\(^{44}\) _Reclamation Accomplishments_, 21; Mack Corbett, “Reclamation in Utah Past, Present, and Future,” _Utah_, 10 (June 1948), 4–5.
increased to 500 percent of the 1910 figure. Adjoining areas without adequate water had increased only 200 percent.

The Strawberry Valley project was relatively small compared with more recent projects. Only thirty-five new farm units were opened for entry on the public domain. Farmers used project water to develop about 16,000 acres of land which were privately owned but not irrigated, and about 26,000 acres benefited from the supplement of water supplies from the project. Studies by private and federal agencies indicate that by 1955 12,000 of the 24,000 persons in the project area lived there as a result of the project. As Albert Swenson, one of the early farmers put it, “Before the Strawberry was finished we used to get one crop of alfalfa on the east bench — and that was it. During a dry year we just burned up.” By 1955 three cuttings of alfalfa were the rule. To utilize the newly available alfalfa, new alfalfa mills were erected in Spanish Fork in 1919 and Payson in 1920. Two new vining stations for threshing peas and beans were established at Keeler and Mapleton.45

Benefits from the project have passed through several stages.46 In the first, or construction phase, which lasted from about 1906 to 1915, in-


46 This analysis of the periods of development on the project is adapted from Reclamation Accomplishments.
creased employment, the growth of retail sales, and increased real estate value resulted from the anticipation of the water. An increase in inbound shipments and increased revenues from the activities of the contractor also helped promote development. Wholesale trade increased in the region, existing plants expanded, and transport facilities enjoyed increased revenues.

In the period between about 1915 and 1926, the project lands were undergoing development. Homes, schools, churches, and roads were constructed. People began to purchase more farm machinery and home furnishings. Government units began to reap the increase in property tax revenues, and the effects of the new investments in consumer durables were felt in the area beyond the project.

The period since 1926 has been an operational stage. The local economy was somewhat stabilized, though at a low level during the 1920s and 1930s. Permanent industries such as the sugar factory came into the area. Sales of municipal power and water and available recreation facilities contributed to development during the two latter stages until by 1955 the value of the power, municipal water, and recreation facilities provided by the project amounted to $500,000 per year or about one-seventh of the project cost.

Commercial development of electric power, though not at first anticipated as a feature of reclamation projects, came to benefit those in the project area. After it was learned that power would be utilized to construct the dam and tunnel, water users petitioned the government to leave the power plant. From 1907 it was contemplated that power should be furnished to local towns. The Strawberry Valley Project was one of the government's earliest power projects. The Townsite Act of 1906 authorized installation of generators on the Roosevelt Dam in Arizona. It used to be believed that the first power plant constructed and operated by the bureau was located on the Minidoka Project in Idaho. Neither the generator on the Minidoka Project nor that at Roosevelt Dam began operation until 1909. The Upper Spanish Fork Power plant was in operation on December 13, 1908; as nearly as the author can determine this was the first power plant to be operated by the Bureau of Reclamation.47

Part of the development has come through the recreation facilities offered by the reservoir area. As early as 1911, sports enthusiasts such as Governor William Spry visited the waters of Strawberry and caught their

47 Reclamation Accomplishments, 15; Bureau of Reclamation Report, 1907, 222; 1909, 185; Shad and Rose, 22. For the Starting dates of the delivery power on the Roosevelt Dam and on the Minidoka Project see Reclamation Project Data, 357, 668.
limits. The reservoir was stocked by game fish from state hatcheries; deer and other big game are found in the mountains near the reservoir; and land near the reservoir harbors upland game birds. As early as 1917 a number of cabins had been built near the lake and by 1955 more than 300 private cabins had been located there. In addition, four camp sites and 60 public cabins were available for use. More than 600 private boats had been licensed for use on the reservoir. More than eighty-five percent of the fishermen who came to fish lived within a ninety-mile radius of the reservoir and thus contributed to Utah’s sporting goods businesses. In 1955 it was estimated that a total of 175,000 people visited the reservoir and that they spent an average of $5.80 each.48

In the thirteen years between 1955 and 1968, the recreational use of the reservoir and surrounding lands increased tremendously. Arthur W. Finley, president of the Strawberry Valley Water Users’ Association reported that an estimated 1,700 boats and a total of 20,000 people used the lake and other facilities of Strawberry Valley on the opening day of the 1968 fishing season. The same year, the association sold 5,407 boat permits, 111 permits to leave trailers in the valley for the season, and 489 cabin permits of which 18 were new. The increase in boat permits alone in the thirteen-year period amounted to more than 900 percent, and the increase in cabins to more than 130 percent.49

On the basis of the evidence, it is difficult to conclude that the Strawberry Valley Project has been anything but successful. Southern Utah Valley, which might have gone the way of its neighboring areas to the south, has prospered. In recognition of this fact, the federal government authorized what amounted to an expansion of the project to include the diversion of further water from other tributaries of the Colorado River into the Great Basin. This expanded project which was initially approved in 1956 has been named the Central Utah Project. Since that time, further federal appropriations have continued the project which will divert water into Juab County and other areas further to the south, with the hope that they will prosper as southern Utah County has prospered.50

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49 Finley interview, January 27, 1969.
50 Edward Leo Lyman, “More Water for Utah Through the Central Utah Project,” (Senior Seminar Paper, Brigham Young University, 1965), 18 and map.
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