

The Eden Project

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The Eden Project

In the cradle of the Green River Basin, just west of the Wind River Mountains below the South Pass, is the windswept, sandy Eden Valley. Pioneers in the early nineteenth century passed through this arid valley on their way to the milder climates of Oregon and California, stopping only to water their livestock at the Big Sandy Creek and rest for the night. Very few gave the area a second thought until the growth of the ranching industry in the late 1800's. Even then, the cold, prohibitive climate and desert-like water conditions deterred the less hardy settlers from making their homes permanent. By the late nineteenth century, it was clear that if settlements in the Valley were to prosper, the construction of an irrigation project was necessary. The challenge of making efficient use of what surface water there was in the Eden Valley fell to various private and government agencies, which struggled with overcoming technological and bureaucratic difficulties to enable the Eden Project to successfully irrigate the farmlands of the Eden Valley.

Project Location

The Eden Project, named for its proximity to the little town of Eden, Wyoming, predominately serves farms in the northern section of Sweetwater County (population 38,823) in the north eastern corner of the Green River Basin. The Eden Valley (population 585) is bordered on the north by the Gros Ventre Mountains, the Wind River Mountains on the east, and the Uinta Mountains and the Wyoming Mountains on the south and west respectively. In this little pocket of the Rockies runs the Big Sandy Creek, its tributary, the Little Sandy Creek, and the smaller tributaries, Dry Sandy and Pacific Creeks. The farms surrounding Eden (10 miles south), Farson (15 miles south), and Rock Springs (40 miles south) are the recipients of the irrigation waters from the Eden Project. The elevation of the Eden Valley is between 6,560 and 6,680 feet above

sea level and average annual temperatures range from -48 degrees Fahrenheit to 95 degrees Fahrenheit (with a mean temperature of 38 degrees Fahrenheit). Because of the high elevation and the severe temperatures, the growing season of the Valley ranges from 90 to 124 days. A minimal average annual rainfall of seven and a half inches makes every drop of water critical to the survival of agriculture in the arid Valley.¹

Historic Setting

Wyoming traditionally is one of the lesser populated states, and as a result, is often overlooked in its importance in the history of the United States. But in the words of Margaret Murie, an early Wyoming pioneer, the state has special qualities all its own.

At last, the wide sky, the wide land, broken and bare but stretching far to the limitless blue sky of Wyoming. Room to breathe, to stretch one's soul's wings again. Here the big country still is. Always a joy to come back, to find it still big, still stretching away, meeting and passing startling buttes which rise here and there, and dry watercourses ... once in a while a few cattle, a band of antelope in the sage, some horses galloping in the wind. After the cities, a wave of thankfulness rises in my heart, that the great United States still has some room some great spaces ... This is the wide desert scene of Wyoming. Somehow the wide free sageland, the spacious desert and all its creatures, seems a fitting introduction to the mountains, a contrast yet a harmony, for it is all the natural free earth. Man is here, but he has not yet laid a heavy hand on his surroundings.²

Prehistoric Setting

The Eden Valley is a part of the larger Wyoming Basin, an arid region surrounded by the Colombia Plateau, the Great Basin, and the Great Plains. It has functioned as a travel corridor for migrant groups traversing the Continental Divide for hundreds of years. Archaeological evidence indicates that early residents of the Eden Valley were small extended family groups of

1. Department of the Interior, Water and Power Resources Service, *Project Data* (Denver: United States Government Printing Office, 1981), 447; Department of Agriculture, *Water and Land Resources in Eden Valley, Wyoming* (Fort Collins: Colorado State University, 1973), 1-3, 17, 33; Department of the Interior, Bureau of Reclamation, *Planning Report Concluding the Study on Big Sandy River Unit, Wyoming* (Denver: United States Government Printing Office, 1987), 2; www.census.com, 10 July 2000.

2. www.gorp.com, 10 July 2000.

hunter/gatherers who subsisted primarily on bison; inhabiting the Valley regularly in a constant pursuit of their food supply. By A.D. 1500, the Wyoming Basin was dominated by the historic Shoshone tribe, although, the Ute and the Crow conducted forays into the Valley from time to time. With the arrival of European explorers in the mid 1600's, horses and European weapons and technology were integrated into the Shoshone lifestyle. This provided them with greater mobility in their search for sustenance. Eventually, however, the Shoshone of the Wyoming Basin, as well as other surrounding tribes, came into conflict with migrant settlers and were forced onto reservations in the late eighteen hundreds.³

Historic Setting

In 1806, John Colter, left the Lewis and Clark Expedition, and traveled south, becoming the first Anglo explorer to set foot in Wyoming, though most of his expedition covered the northern section of the state, within 20 miles of what is now Yellowstone National Park. Ezekiel Williams was the first, in 1807, to explore the Wind River Mountain Range, about 40 miles to the north and east of the Green River Basin. But it was the Pacific Fur Company's expedition, known as the Overland Astorians (led by Wilson Price Hunt), in 1811, to first travel through the South Pass and into the Eden Valley on their way to Oregon.⁴

Adventurous mountain men were regular visitors to the Valley after 1824, attending rendezvous in the summer to drink, gamble, and tell tall fur trapping tales. The rendezvous of 1825 and 1834, both held in Sweetwater County, were the first and the largest respectively, and included the likes of William Ashley, Jedediah Smith, David Jackson, William Sublette, and

3. Sturtevant, William C., *Handbook of North American Indians, Volume 11* (Washington, D.C.: Smithsonian Institution, 1986), 308-9; Pastor, Jana V., Editor, *Seeds-Kee-Dee: Riverine Adaptation in Southwestern Wyoming* (Provo: Brigham Young University, 2000), 10-5; Kopper, Philip, *Smithsonian Book of North American Indians: Before the Century of the Europeans* (Washington, D.C., Smithsonian Books, 1986), 190-1; www.gorp.com, 10 July 2000.

4. Larson, T. A., *Wyoming: A Bicentennial History* (New York: W. W. Norton & Company, Inc., 1977), 9-39; www.gorp.com, 10 July 2000.

James Bridger. Pioneers along the California, Oregon, Mormon, Overland, Cherokee, and Bozeman Trails all followed the path of the mountain men through the South Pass and into the Valley in the middle nineteenth century on their way to greater opportunities further west. James Bridger in 1839, after the decline of the fur trapping industry, set up a small trading post near the confluence of the Big Sandy Creek and the Green River, for a brief period. Even the Pony Express, in its short career in 1860, ran a route through the Valley. But until the late 1860's, no one came to the Eden Valley to stay.⁵

Before permanent settlements could be established in Wyoming, the matter of the Indians had to be settled. Neither the settlers, the military, nor the Indian tribes were fighting for dominance over the arid and unproductive territory in Wyoming. Rather, both the Americans and the Indians were struggling for control of their own destiny; the Eden Valley and the rest of Wyoming just happened to be the battlefield. Between 1862 and 1868, the Cheyenne, Sioux, Arapahoe, and Shoshone, among others, attacked what Anglo settlements they could. It was not until completion of the transcontinental telegraph in 1861, the discovery of gold on the South Pass in 1867, construction of the transcontinental railroad through most of southwestern Wyoming in 1868, and the treaty agreements that established the Wind River Reservation in that same year, that much of the hostility came under control. Because of these factors, settlement in Wyoming became safer and more feasible, saving the area from being absorbed into more populated surrounding territories like Colorado. On May 18, 1869, less than a year after the railroad was completed through Cheyenne, Wyoming officially became a Territory. Organized settlements began to appear and even remote places like the Eden Valley welcomed settlers.⁶

5. *Project Data*, 447; *Water and Land Resources*, 4; Larson, 1-18, 55, 71-3, 118; www.swchm@sweetwater.net, July 3, 2000.

6. Larson 67-74.

What attracted settlers to the Eden Valley were its grasslands punctuated by creeks that kept it vegetated. Despite the altitude and harsh climate, it appeared to be well suited for raising livestock in a time when stock raising, though often risky, became extremely profitable in the West. Both cattle and sheep were raised in the Valley by the late 1860's, often producing tension between cattle and sheep ranchers over the use of natural pasture. For many ranchers, after the conclusion of a series of brutal range wars over the issue of grazing, the solution to this problem was to increase the amount of natural pasture through irrigation. After the drought and winter of 1886, it became essential to irrigate the Valley if ranching was to survive. With a little irrigation assistance, the Valley could be transformed into a ranching "Eden."⁷

The first permits to irrigate the Valley's natural pasturelands were issued in 1866 by the Eden Irrigation and Land Company, a private organization created to develop small irrigation projects in the Eden Valley. But, in this era of the West, it was often expensive and unproductive for private companies to shoulder the financial burden of construction and operation and maintenance of irrigation projects. The passage of the Carey Act in 1894 attempted to alleviate this situation to a certain extent, by providing incentives to the states in the form of land grants up to 1,000,000 acres. The grants were to be divided into parcels no greater than 160 acres and no less than 20 acres, the sale of which would help fund irrigation construction projects. The Reclamation Act of 1902, part of early Progressive Era legislation, allowed for the construction of irrigation projects by the Federal government to be financed by sales of public lands. Operation and maintenance of these projects could be by local organizations. Additionally, Wyoming, unlike most other western states, strategically claimed

7. Robinson, Michael C., *Water for the West: The Bureau of Reclamation 1902-1977* (Chicago: Public Works Historical Society, 1979), 9; *Water and Land Resources*, 4. Pisani, Donald J., *Reclaiming a Divided West: Water, Law, and Public Policy, 1848-1902* (Albuquerque: University of New Mexico Press, 1992), 60; www.swchm@sweetwater.net, 3 July 2000; www.gorp.com, 10 July 2000.

all water rights for itself at the state level in its Constitution of 1889, to equitably distribute irrigation waters; the only stipulation being that the water rights be a right of use and acquired only by prior appropriation, except in the interest of the public good. Between these three legislative actions, it was only a matter of time before larger, more comprehensive projects were undertaken.⁸

Project Authorization

What resulted from this cooperation with the federal government in the Eden Valley was the formation of the Eden Project. Unlike other projects in Wyoming approved around the same time, such as the Shoshone Project and the North Platte Project, the Eden Project was a limited, local irrigation project, and confined to relatively small acreage. The intent of the Project was to create a canal system to regulate annual water flow to better serve the agricultural needs of the Green River Basin. Under the Carey Act in 1905, the State of Wyoming received 56,327 acres of irrigable public land, and under the Reclamation Act, construction was approved for the Eden Dike and Canal system, which the Eden Irrigation and Land Company and Reclamation finished in 1914. However, no consideration at this time was given to the creation of storage features. Instead, farmers and ranchers relied upon seasonal rainfall to stock the streams and the irrigation canals.⁹

Between 1914 and 1939, the Eden Project successfully irrigated 9,000 acres annually in the Valley, but without regular maintenance, it fell into disrepair and needed to be rehabilitated. Under the Water Conservation and Utilization Act of August 11, 1939, President Franklin Roosevelt authorized rehabilitation of the Eden Project. On September 18, 1940, a plan of not only rehabilitation, but further development, was approved for the Valley as part of the Great

8. Robinson, 9; Pisani, 60.

9. *Water and Land Resources*, 4; Pisani 252.

Plains Project, under the water conservation provision of the Interior Department Appropriation Act of 1940. The Great Plains Project was specifically designed to alleviate the tragedy of the Midwestern farmer in the critical drought decade of the 1930's. The Bureau of Reclamation was given authority to rehabilitate the existing facilities on the Eden Project and construct a larger, more modern facility including a dam and reservoir (named after Big Sandy Creek) and larger irrigation and drainage facilities. In conjunction with the Bureau of Reclamation, the Farm Securities Administration (a section of the Department of Agriculture) would oversee the operation and maintenance of the Project and the development of the Project lands. Labor was to be provided by the Civilian Conservation Corps and the Works Progress Administration, as part of the continued "relief" program of the New Deal.¹⁰

As construction began in 1941, America's involvement in World War II increased and many men and women left their homes and families to fight in the European and Pacific theaters. Unfortunately for the Eden Project, the labor supplied by the Civilian Conservation Corps and the Works Progress Administration was reassigned to other, more vital locations throughout America. The order to cease construction entirely came from the War Production Board on December 24, 1942, though irrigation services continued to be provided. The site was turned over the Soil Conservation Service for operation and maintenance in 1945. Irrigation services continued to be provided to the Valley through the original dike and canal system during the war years. The Eden Rehabilitation and Construction Project stood at 16% complete from 1942-1949.¹¹

10. *Project Data*, 449-50; Denver National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, Project Histories, *Eden Project, Wyoming, Volume 1*, (Denver: United States Government Printing Office, 1941), 1, 21; *Water and Land Resources*, 7; Department of the Interior, Bureau of Reclamation, *Annual Report of the Secretary of the Interior, 1941* (Washington D.C.: United States Government Printing Office, 1941), 15-6.

11. *Eden Project, Wyoming, Volume 2* (1942), 1; *Eden Project, Wyoming, Volume 6* (1950), 1.

On June 28, 1949, Congress re-authorized completion of the Eden Project with some construction alterations to increase the amount of irrigated lands. Improvements to the Eden Dike and Canal system and construction of the Big Sandy Creek Dam and Reservoir resumed on July 17, 1950. The alterations included construction of Eden Dam and Reservoir and relocation and expansion of the Eden Canal. The Bureau of Reclamation relieved the Department of Agriculture of the operation and maintenance responsibilities on the Project, but the Department of Agriculture had to complete Project land development and settlement features. On April 11, 1956, the Colorado River Storage Project Act (CRSP) passed which included the Eden Project as part of a program in which the use of power revenues from CRSP could be used as repayment assistance on the Project for costs of the Project beyond what the water users were able to pay (in conjunction with the Eden Project Act of 1949). This legislation enabled the Eden Project to be completed in a more timely manner.¹²

Construction History

In the 1870's, both of the great rival surveyors, Ferdinand Hayden and John Wesley Powell, passed through the Green River Basin by way of the South Pass and surveyed the Eden Valley for the United States Geological Survey (USGS). But it was not until the advent of the cattle ranching industry and completion of the transcontinental railroad, that it became necessary for the residents of the Valley to seek out irrigation possibilities to sustain population growth and economic prosperity.¹³

Based on the USGS descriptions of the area, a construction plan was developed by the Reclamation Service in conjunction with the Eden Irrigation and Land Company in 1905. The

12. *Eden Project, Wyoming, Volume 6* (1950), 1; *Project Data*, 450; *Water and Land Resources*, 8; Department of the Interior, Bureau of Reclamation, *Federal Reclamation and Related Laws, Annotated, Volume 1* (Washington, D. C.: United States Government Printing Office, 1972), 954-5, 1251-3.

13. White, Richard, *Its Your Misfortune and None of My Own* (Oklahoma City: University of Oklahoma, 1991), 133-5.

plan included the construction of a canal off stream from Big Sandy Creek at Little Sandy Creek to divert irrigation water to 9,000 irrigable acres (of an original appropriated acreage of 56,327 acres of Federal public land) to the south. The Eden Irrigation and Land Company (with Reclamation) funded and constructed the Eden Project through the sale of construction bonds in the amount of \$800,000, to be repaid over 10 years by water users.¹⁴

Construction of the system was assigned to the Reclamation Service under the Reclamation Act of 1902 and operation and maintenance of the Project was given to the Eden Irrigation and Land Company, which in 1914, became the Eden Irrigation District. By 1907, construction on one large earthen dike (called Eden Dam) and two smaller earthen dikes, which collected water diverted from Little Sandy Creek and transported it through the Eden Canal, had begun. By 1914, the Project was finished and turned over to the Eden Irrigation District, successfully delivering water via the canal to local farms.¹⁵ As with many other projects developed under the Carey Act, a lack of funds to operate and maintain the Eden Project of 1907 precluded it from reaching its full potential. The Reclamation Service investigated the area in 1915, and recommended expansion of the Project to include a storage feature to make it more effective. But by 1916, nothing had been constructed and the consensus from the Reclamation Service was that the Eden Project in the Green River Basin was being systematically abandoned for lack of effectiveness. The simple earthen dikes suffered significant seepage by 1924 due to a lack of funds for routine maintenance and the Eden Irrigation District was in a state of “financial wreck.”¹⁶

14. *Project Data*, 447; *Eden Project, Wyoming, Volume 41* (1986), 30.

15. *Project Data*, 447; *Eden Project, Wyoming, Volume 41* (1986), 30; *Water and Land Resources*, 4; Pisani, 252; Department of the Interior, Bureau of Reclamation, *SEED Data Book; Eden Dam, Volume 1* (Denver: Operation and Structural Safety, 1981), 3.

16. Denver, National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, *Report for the Wyoming Cooperative, June 14, 1915* (Denver: United States

(continued...)

The Eden Irrigation District defaulted on its construction bond obligations and was passed to C. E. Howell in a receivership in 1927; though irrigation water continued to serve local farms. That same year, it was sold to the Rock Springs Water Company, Inc. In 1932, the irrigation district was again sold, this time to be purchased by the Wyoming Land and Water Company for a foreclosure rate of \$20,000. The residents of the Eden Valley became disillusioned with their experiences with government assisted irrigation projects at this point. Because of disorganization and poor construction, local farmers suffered the loss of the water they needed for their farms in a time when America's farmers were plagued by the burden of drought in the Great Depression. The Bureau of Reclamation re-investigated the Project in the mid 1930's, and it was determined that the service the Project provided was essential, but the structures were poorly designed, constructed, and maintained, and there were insufficient funds to operate and maintain them. As a result, by 1940, the entire project was in a severe state of disrepair and had to be rehabilitated.¹⁷

In response to the problem, the Bureau of Reclamation approved construction of a larger reservoir and canal system that would divert water to a greater number of irrigable acres. Reclamation determined the Project would provide water to 20,000 acres (11,000 acres more than originally planned) of the 56,327 acres originally withdrawn for irrigation. This new plan called for diversion of water from the Big Sandy Creek for distribution through a system of main

16. (...continued)
Government Printing Office, 1915), 3; Denver, National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, *Report of the Board of Review* (Denver: United States Government Printing Office, 1916), 5; Denver, National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, Entry 7, Correspondence, Memorandum; Edward Mead, *Commissioner of the Reclamation Service to Frank Emerson, Wyoming State Engineer* (1924).

17. *Water and Land Resources*, 5-6; *Project Data*, 449-50.

canals and laterals.¹⁸ Construction was to be supervised by the Bureau of Reclamation. The operation and maintenance of the Project, as well as settlement of lands and administration of the repayment schedule fell to the Farm Securities Administration. The Civilian Conservation Corps (CCC) and the Works Progress Administration (WPA) provided the labor for construction in the 1941 period of the Project. However, the WPA never did send any laborers to the Project site. The CCC built two unit camps which were located on the south end of the construction zone. Some of the CCC enrollees came from other Reclamation Projects such as the Colombia Basin Project in Washington. The first camp contained the barracks that housed the CCC and the facilities that serviced them. The second camp contained seven administrative residences for Farm Securities Administration employees. Of the seven residences built, six of them later were moved and converted for use on farms in the irrigated area.¹⁹

The funds for the 1941 rehabilitation and construction project were allocated by Congress in the following proportions for a total estimated cost of \$2,445,000.

Bureau of Reclamation	\$1,000,000	Construction
Farm Securities Administration	\$ 200,000	Operations and Repayment
	\$ 145,000	Buyout to Wyoming Land
		And Water Company
Civilian Conservation Corps	\$ 670,000	Labor Costs
Works Progress Administration	\$ 575,000	Labor Costs

The actual amount spent in 1941, to complete 16% of the necessary construction, was \$13,378.21. The rehabilitation of the Eden Dike and Canal system, the construction of the new and larger Big Sandy Creek Dam and Reservoir, and the Means Canal, as well as a series of lateral canals, began July 30, 1941.²⁰

18. *Eden Project, Wyoming, Volume 1* (1941), 1; *Eden Project, Wyoming, Volume 41* (1986), 30.

19. *Eden Project, Wyoming, Volume 1* (1941), 4; *Eden Project, Wyoming, Volume 41* (1986), 30; *Annual Report, 1941*, 47.

20. *Eden Project, Wyoming, Volume 1* (1941), 4; *Eden Project, Wyoming, Volume 41* (1986), 30.

With the entrance of the United States into World War II, construction on the Project was halted in 1942. When construction ceased, the funds were reallocated to other agencies to assist the allied war effort. Finally, on June 28, 1949, Congress re-approved construction of the expanded reservoir and canal system that would culminate in two dams, two main canals, a diversion dam, two main canal systems, and two laterals. The reconfigured Project of 1949 was appropriated \$4,828,000 by Congress for the cost of construction. Final surveys were conducted between August 29, 1949, and October 1, 1950. The Eden Valley Irrigation and Drainage District was created on April 11, 1950, to assume the operation and maintenance of the Project once construction was completed. They also became responsible for the repayment of the Project through the sale of rights of use at a rate of \$1.25 an acre for 60 years, though Reclamation continued to hold the water rights. Bidding closed on June 19, 1950, and the contract for construction was awarded to S. J. Groves & Sons Company from Minneapolis. Construction on the Big Sandy Creek Dam began August 14, 1950, and proceeded without incident. Work was completed in stages, the first finished in 1953 with completion of the Big Sandy Creek Dam and Reservoir and the last in 1970 with completion of the last lateral canal. The Project was turned over to the Eden Valley Irrigation and Drainage District for operation and maintenance by Reclamation on January 1, 1970.²¹

Development of the Project required special attention to the type of land, to ensure efficient use of diverted water from Big and Little Sandy Creeks. The Valley contains five classes of land ranging from one to five. These classes indicated a variety of sand and clay textures, underscored by shale of shallow to medium depth. A significant portion of this land requires drainage and sits at a slope of six to twelve percent which, unfortunately, is not

21. *Eden Project, Wyoming, Volume 41* (1986), 30; *Eden Project, Wyoming, Volume 6* (1949), 1; *Annual Report, 1949*, 63.

conducive to effective irrigation. Of the original 56,327 acres of Project lands, there are 38,000 acres of land which are suitable for irrigated agricultural production but 9,300 acres of it require significant drainage, allowing only 28,700 acres for feasible irrigation, of which only about 20,000 acres are actually irrigated. Overcoming these geographical factors was key to the success of irrigation in the Valley.²²

In 1941, there was some controversy over acquisition of privately owned land in the construction zone. Some land owners did not want to accept the terms and prices Reclamation offered. In a counter offer, Reclamation suggested an exchange of private land for public land outside the Project area. Some land owners accepted the deal, others rejected it and Reclamation had to resort to a declaration of eminent domain. In addition to this issue, it was also difficult for the construction companies to locate adequate aggregate materials for concrete to line the spillways and other outlet works. After some investigation and research, the right materials were located by the Green River further to the south.²³ There were few problems in construction of the Project. In fact, one of the more interesting aspects of the Project is that the farmers and ranchers of Wyoming jointly demonstrated the need to supplement existing natural pasture with irrigation in order to raise both crops and livestock. This cooperation went a long way in making Wyoming's ranching and agricultural industries, especially in the Eden Valley, more stable.²⁴

The Project consists of three dams, one dike, two reservoirs, two main canals, and two laterals. Eden Dam, a modernized version of the old dike and canal system, is the largest in a series of irregular earthfill structures located 10 miles to the north of Farson, off stream from

22. *Water and Land Resources*, 18-22.

23. *Eden Project, Wyoming, Volume 1*" (1941), 19, 25, 47; Pisani, 63.

24. Pisani, 63.

Little Sandy Creek. Water is diverted from Little Sandy Creek by Little Sandy Diversion Dam and is channeled to Eden Reservoir by the Little Sandy Canal. The Means Canal diverts water from the Big Sandy Creek Reservoir into Eden Reservoir as well. The Eden Dam is 25 feet in height with a crest length of 3,500 feet and contains 92,000 cubic yards of earthen material. The outlet works include an uncontrolled concrete overflow structure above orifice gates (used only as an emergency spillway) and a concrete lined tunnel controlled by constant head orifice gates. The reservoir has a total capacity of 7,500 acre-feet, of which 7,100 acre-feet are considered active. The total surface area of the reservoir is 900 acres. Little Sandy Diversion Dam and Canal are located generally to the west of Eden Canal adjacent to Eden Reservoir. Completed in 1957, the canal is 4 miles long and has a diversion capacity of 150 cubic feet per second. Water flows from Eden Reservoir to into Little Sandy Canal and then into the Means and Eden Canals.²⁵

The Eden Canal originally flowed directly from the old dike system, but in 1955, it was relocated several miles below Eden Dam and branches out of the newly constructed Means Canal. It is 10.8 miles long and has a diversion capacity of 475 cubic feet per second. Its bottom width is 18 feet, and the average water depth is 5.2 feet.²⁶

Big Sandy Creek Dam is a zoned earthfill structure located on Big Sandy Creek. It is 85 feet high, has a crest length of 2,350 feet, and contains 840,000 cubic yards of material. The outlet works include an uncontrolled side channel ogee weir and a concrete lined chute on the right abutment, as well as a concrete conduit through the base of the dam controlled by two 3.5 foot-square high-pressure slide gates. On the north side of the reservoir is Big Sandy Dike which closes a low section in the bank of the reservoir. The dike is 18 feet high, has a crest

25. *Eden Project, Wyoming, Volume 41* (1986), 30; *Project Data*, 450.

26. *Project Data*, 450.

length of 8,300 feet and contains 107,000 cubic yards of earthen material. The total capacity of the reservoir is 39,700 acre-feet, of which 38,300 acre-feet are considered active. The total surface area of the reservoir is 2,510 acres. Water flows basically south from the Reservoir into the Means Canal and then into the laterals.²⁷

Named for Alfred Means, who carved his name in a stone on the Project site in 1840, the Means Canal flows from Big Sandy Creek Dam to Eden Canal and beyond in a generally southerly direction. Constructed in 1952, it is 6 miles long and has a diversion capacity of 635 cubic feet per second. The bottom width varies between 22 and 28 feet, the sides are set at a 2:1 slope, and the average depth of the canal ranges between 5.85 feet to 6.9 feet.²⁸ The two lateral canals, Westside and Farson, have an aggregate length of 94 miles with a diversion capacity ranging from 6-160 cubic feet per second. The drainage system for the irrigated areas includes surface drains that are 2.5 feet in depth and subsurface drains that are 10 feet in depth.²⁹

Post Construction History

As with all structures, those of the Eden Project have not been exempt from the problems that occur due to constant use and age. An investigation in 1981 determined that the spillway at Big Sandy Creek Reservoir required immediate repairs because of deterioration. A cofferdam was constructed in 1983 and repair work on the spillway began in 1984. Refurbishment of the spillway was completed in 1985. A second inquiry revealed that Little Sandy Diversion Dam and Eden Dam needed work. Four gates at Eden Dam were replaced and the outworks and conduit at Little Sandy Diversion Dam were overhauled in 1986. The Bonneville Construction Office of the Upper Colorado Region made the repairs on all features in the mid 1980's.³⁰

27. *Project Data*, 450.

28. *Project Data*, 450. *Eden Project, Wyoming, Volume 41"* (1986), 1.

29. *Project Data*, 450.

30. *Eden Project, Wyoming, Volume 41* (1986), 31-7.

Settlement of Project Lands

Initially, Project lands were to be administered by the Eden Irrigation District and were sold starting in 1910, but due to financial struggles of the District, settlement activities were transferred to several other operation and maintenance companies. Most of the project lands were settled around this time. The Department of Agriculture, through the Farm Securities Administration, and later the Soil Conservation Service, administered Project lands between 1941 and 1949. The Bureau of Reclamation took over project land settlement in 1949 and then passed it on to the Eden Valley Irrigation and Drainage District in 1970. As of 1992, there were 75 farms served, with a population of 247, by the Eden Project (a decrease in the number of farms served from 93, population 287, in 1977). Population in Sweetwater County, where the Eden Project is located, has declined since 1986 from 41,723 to 38,823 in 1990, and as a result, the number of farms may also have declined. Currently, the Bureau of Land Management administers the land rights of way and the State of Wyoming's Engineer's Office issues all land and water permits.³¹

Uses of Project Water

The Eden Project has been instrumental to the farming community of the Eden Valley. Of the 39,700 acre-feet of water that the Project stores in two reservoirs, 33,000 acre-feet are used for irrigation, 1,400 acre-feet are used for fish and wildlife, and the remaining 5,300 acre-feet is sediment retention. Unfortunately, the sediment increases every year. There is also concern over the level of salt contained in the Project water because water from the Valley eventually flows into the Green River and finally into the Colorado River. Because the Colorado

31. *Water and Land Resources*, 5; *Eden Project, Wyoming, Volume 12* (1956), 3; Pisani, 228; Department of the Interior, Bureau of Reclamation, *1992 Summary Statistics* (Denver: Water, Land, and Cultural Resources, 1992), 61, 64.

River's saline content has been consistently increasing towards unacceptable levels, it has become imperative that the Bureau of Reclamation research all possible avenues for the removal of salt in tributaries of the Colorado River.³²

The Eden Project runs at about a 57% delivery loss. Farm ditch loss (15%), percolation loss (35%), and surface runoff (7%) account for the disbursement of water not used for irrigation. The average crop distribution for the Valley over a total of 17,010 irrigable acres includes the following:

Small grains	15 acres
Alfalfa	2,751 acres
Other hay	9,301 acres
Cultivated pasture	2,057 acres
Non-harvested	279 acres
Silage or Ensilage	96 acres
Idle land	1,960 acres
Land not irrigated	551 acres

Annual income over 14,499 acres irrigated for 1992 is \$120.49 per acre, for a total of \$1,747,018.³³

Average annual delivery is 2.49 to 3 acre-feet per acre in a region that requires 1.38 acre-feet per acre. In order to decrease delivery loss and increase annual acre-feet utilized, Reclamation conducted an inspection in 1960. The findings of the inspection uncovered poor design and construction of the major structures. Operation and maintenance had suffered due to lack of funds to make necessary repairs. Poor surface and subsurface drainage was apparent, as well as an inordinately high loss of water due to seepage and a high water table. Repairs designed to decrease delivery loss were completed at a cost of \$461,981, in 1967. These repairs

32. *Water and Land Resources*, 9. *Planning Report*, 8-9.

33. *Eden Project, Wyoming, Volume 41* (1986), 31-2; *1992 Summary Statistics*, 53. For comparative statistics from the 1980's see *Water and Land Resources*, 3, on crop values. Note the decline in irrigated land. Also see *Project Data*, 450, for comparative statistics from the 1970's.

included re-lining the canals and construction of a new lateral. These improvements increased irrigation capacity of the Project by 4,700 acre-feet annually. Decreasing delivery loss to 52% provided more efficient use of Project water.³⁴

The Wyoming Recreation Commission, Department of Commerce, and Wyoming State Parks and Historic Sites oversee the recreation facilities of the Project. Camping, boating, fishing, and picnicking are available at Big Sandy Creek Reservoir. Annual visitation at Big Sandy Creek Reservoir, on the average, is 2,500 persons.³⁵

Conclusion

Construction of the Eden Project, Wyoming, spanned about 60 years of active and postponed construction. It began with a simple series of earthen dikes and a canal and has become a larger, more modern system of earthfill dams and canals. The success of this Project was debatable at any given point in its history. The original canal system was not technologically sound and therefore did not efficiently provide water to the necessary areas and did not plan for possible expansion. World War II caused a seven year delay in the necessary rehabilitation of the old canal and construction of new reservoirs and canal systems. By 1949, with the second project only 16% complete, it would be 21 years before the entire system was finished.

The small communities of Eden and Farson have carved their living out of the harsh Wyoming seasons to raise livestock and feed to support their families. From the earliest irrigation projects in 1866 to the present, residents of Eden Valley are constantly concerned with improvement of the efficiency of irrigation. The Bureau of Reclamation plays a critical role in

34. *Water and Land Resources*, 6, 109-19; *1992 Summary Statistics*, 76.

35. *Project Data*, 450; *1992 Summary Statistics*, 111, 116.

the survival of the Valley by facilitating those improvements and constructing the necessary additions to the expanding facilities. The Eden Project will continue to support the best efforts of the residents of Eden Valley in their pursuit of economic security.

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