

Shadehill Unit: Pick-Sloan Missouri Basin Program

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Shadehill Unit

Pick-Sloan Missouri Basin Program

The Flood Control Act of 1944 authorized the construction of literally dozens of irrigation projects in the Missouri River basin. Some, like the Garrison Diversion Unit and the Oahe Unit, are large in scale and the subjects of much controversy; others are much smaller and less well known. South Dakota's Shadehill Unit fits in the latter category. Designed to provide water to about 3,000 acres of irrigable lands, the earthfill dam and reservoir on the Grand River, the unit's only major features, service even less acreage than that. Indeed, the Shadehill Unit plays a modest role in the post-World War II effort to harness the waters of the Missouri River and its tributaries for the benefit of man.

Project Location

The Shadehill Unit is located in northern South Dakota. Perkins County is the second largest county in the state with a total area of 2,872 square miles, and it is dotted with small towns and homesteads. Federal Highways 12 and 212 skirt the northern and southern borders of the county, respectively, but even most of the main roads are gravel or dirt. The largest city in Perkins County is Bison.¹ Shadehill Dam is located on the Grand River, a tributary of the Missouri River, about twelve miles south and two miles west of the South Dakota community of Lemmon. The climate is dry and hot in the summer and cold in the winter; in fact, the Great Plains is famous for climatic extremes.

¹ NACO (National Association of Counties), "Perkins County, SD," <http://www.naco.org/>.

Annual precipitation in the project area is less than sixteen inches, and the growing season spans only 126 days.²

Historic Setting

The first peoples to occupy what is now the Great Plains were Paleo-Indians, hunters of large mammals. Later, when large mammals became extinct, they adapted by hunting more kinds of animals and gathering plant foods. In the Woodland Period, about 1000 A.D., they congregated in larger groups after becoming more efficient at hunting big game, and beginning around 200 B.C. they began making pottery and building pottery mounds.³ The earliest peoples to inhabit the plains predated the Plains Indians of the modern era by thousands of years.

The peoples and cultures on the Great Plains shifted dramatically in the eighteenth century as forced relocations and migrations brought new peoples into the region. The Dakota and Lakota were forced west from Minnesota by the Chippewa. The Santee and Yanktonais tribes of the Dakota settled along the Red and James river valleys in the eastern Dakotas. The Lakota, or Teton Sioux, pushed further west into western South Dakota: the Oglala toward the Black Hills region; the Brule near the Niobrara, White, and Bad rivers; the Saone to the tributaries of the Missouri River from Cheyenne River north to Heart River. Teton bands occupying northwest South Dakota freely roamed the plains to hunt for bison.⁴

² U.S. Department of the Interior, Water and Power Resources Service, *Project Data* (Denver, Colorado: United States Government Printing Office, 1981), 1000.

³ South Dakota State Historical Society, "Chronology of South Dakota History," http://www.sdhistory.org/soc/soc_hist.htm.

⁴ Raymond J. DeMallie, editor, *Plains*, volume 13 of *The Handbook of North American Indians*, William C. Sturtevant, editor (Washington, D.C.: Smithsonian Institution, 2001), 794.

Europeans first made contact with the Indian tribes in the Dakotas early in the eighteenth century. Seeking water passage to the Pacific, in 1738 the Canadian Frenchman Pierre de La Verendrye and his sons almost certainly became the first white men to see the Missouri River in the Dakotas. They were followed by explorers and traders from France, Spain, Britain, and the United States passing through from the south.⁵

Federal-Indian conflicts formed the backdrop to the history of the Dakota Country. Leaders of the western Sioux signed a treaty with the United States in 1851 that delineated specific territorial boundaries for the tribes. The territorial restrictions and white encroachment on Indian lands became a perennial source of conflict. Over the next three decades, the Sioux and the United States waged war. On both sides there were devastating losses; in 1864 the Colorado Volunteer Militia slaughtered 137 Cheyenne at Sand Creek, while on December 21, 1866, Cheyenne and Sioux war parties ambushed and killed Lt. Col. William J. Fetterman and 80 men near Fort Kearny on the Bozeman Trail. For a few years the Sioux and the United States managed peace under the 1868 treaty, setting aside the Great Sioux Reservation that encompasses all of South Dakota west of the Missouri River.⁶

Conflicts resumed in the early 1870s over construction of the Northern Pacific Railroad and the rush of gold seekers into the Black Hills. The United States made a concerted effort to pacify the Indians and round them up on reservations where they would be out of the way of railroads and settlers. In December 1875 the commissioner of

⁵ Elwyn B. Robinson, *History of North Dakota* (Lincoln: University of Nebraska Press, 1966), 25-28; John Milton, *South Dakota: A Bicentennial History* (New York: Norton, 1977), 38.

⁶ *The Handbook of North American Indians*, 794-97.

Indian affairs told Sioux agents that all Sioux belonging on the reservation must return to the reservation by January 31, 1876. In the spring of 1876, the United States sent forces to harass the Sioux, and although the Sioux achieved a singular victory against Lt. Col. George A. Custer's forces at the Little Bighorn, 1877 marked the defeat and close of Sioux armed resistance.⁷

After pacification of the Sioux, the United States encouraged the Sioux to disperse and settle along creeks and rivers within the reservation. Indians farmed and raised cattle, and in other ways the Sioux gradually assimilated into white society. In 1889 Indian commissioners, through some cajoling and fraud, obtained the consent of three-quarters of the adult male population to break up the reservation into five smaller units and to open the rest of the land to settlement. The Agreement of 1889 reduced the Indians land holdings by 9,000,000 acres, opening the land—including the area later to become Shadehill Unit on the Grand River—to non-Indian settlement and farming. On the reservations, Indians received allotments and turned to cattle ranching and dry farming, though drought sometimes made agriculture a losing enterprise.⁸

The federal government did not inform the Indians of the Pick Sloan plan until 1947, though water projects would impact all five reservations. Construction of Fort Randall, Big Bend, and Oahe dams inundated Indian lands and forced the Sioux to relocate. Reclamation later attempted to replace the lost arable lands through the construction of new water projects, but Congress cut back appropriations on many of them.⁹

⁷ *The Handbook of North American Indians*, 797, 799.

⁸ *The Handbook of North American Indians*, 812-16.

⁹ *The Handbook of North American Indians*, 822-23.

Agricultural Development

In the late nineteenth and early twentieth centuries, white settlers migrated to Perkins County, but their numbers remained low. In 1902 George Edward Lemmon began operation of the L-7 ranch near the site of the town that carried his name in addition to leasing 865,000 acres of land on the nearby Standing Rock Indian Reservation. Construction of the transcontinental Milwaukee Road (later known as the Chicago, Milwaukee, St. Paul, and Pacific Railroad) gave rise to small towns in northern South Dakota, including Lemmon in 1906 only a short distance north of Grand River. Increasingly, in the twentieth century, although cattle ranching remained an important industry, small farmers also settled these towns and the surrounding countryside.¹⁰

For a brief time during World War I farmers enjoyed high crop prices, but the prosperity did not long last. Severe drought on the plains in the 1930s exacerbated the already dire economic situation caused by a depressed agricultural economy that many farmers struggled with since the end of the war. By the end of World War II, at the time of authorization of the Shadehill Unit as part of the Flood Control Act of 1944, some prosperity returned to South Dakota agriculture. Crops once more demanded higher prices, and farmers began to enjoy greater production and a higher standard of living due to improvements in technology and infrastructure.¹¹ At Shadehill, wheat dry farming languished at the low output of 6.3 bushels per acre between 1924 and 1943, and then rose as war demands increased reaching a high of 15 bushels per unit in 1948. Farmers made similar gains with the production of barley, corn, oats, rye, and flax. In 1948 the

¹⁰ Lemmon, South Dakota, "History of Lemmon, South Dakota," <http://www.lemmonsouthdakota.com/history.html>.

¹¹ Howard R. Lamar, editor, *The New Encyclopedia of the American West* (New Haven, Connecticut: Yale University Press, 1998), 1067.

crop in the Shadehill Unit area—9,910 acres, including range land—was valued at \$169,901.¹²

Investigations

In 1931 the Army Corps of Engineers, as part of a comprehensive survey of the Missouri River basin, began to survey and investigate the site of a proposed dam and reservoir on the Grand River just below the confluence of the North and South Forks. Known as the “308 Report,” the massive report contained “a general plan for the improvement of Missouri River,” which included eighty projects for flood control, power, navigation, and irrigation. The Corps conducted a topographic survey of the proposed site.¹³ Reclamation joined the Corps in 1938 and did its own reconnaissance studies in the Missouri River basin. In 1939 it tapped into \$1000 from the investigations fund for studies on water supply and planning on the Grand River.¹⁴

The Indian Service hoped to benefit from the rush to develop water resources in the basin. At first it considered building Blue Horse Dam on the Grand River about thirty miles downstream from the Shadehill Dam site. However, Reclamation jointly agreed with the Indian Service to build the Shadehill Dam first and to distribute a portion of storage water for use on the reservation.¹⁵

¹² “Annual Project History, Shadehill Unit, Grand Division, Missouri River Basin Project,” Volume I, 1948, 15, in Record Group 115, Records of the Bureau of Reclamation, Entry 10, Project Histories, Feature Histories, and Reports, 1902-1932, Box 335, National Archives and Records Administration, Denver, Colorado; hereafter cited as “Project History” followed by appropriate volume and page numbers.

¹³ U.S. Congress, House of Representatives, *Missouri River: Letter from the Secretary of War Transmitting a Report, Together with Accompanying Papers and Illustrations, Containing a General Plan for the Improvement of Missouri River*, H. Doc. 238, 73rd Cong., 2nd sess. (Washington D.C.: United States Government Printing Office, 1935), 40.

¹⁴ U.S. Congress, Senate, *Missouri River Basin: Conservation, Control, and Use of Water Resources of the Missouri River Basin in Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas, Iowa, and Missouri*, S. Doc. 191, 78th Cong., 2nd sess. (Washington D.C.: United States Government Printing Office, 1944), 62-63; “Project History,” Volume I, 1948, 9.

¹⁵ “Project History,” Volume I, 1948, 9.

In 1944 Congress combined the reports produced by the Corps and Reclamation and authorized the Missouri River Basin Project (later known as the Pick-Sloan Missouri Basin Program), the largest water development bill in United States' history. In late 1945 and early 1946, Reclamation concluded, in a report on the Grand River, that the water contained high levels of sodium but that it could still be used for irrigation. Meanwhile, E. E. Pedersen, based in Bismarck, North Dakota, supervised topographic surveys of the dam and reservoir site. By fall 1946 this work fell under the supervision of W. W. Baker in Reclamation's Pierre office. He initiated a second survey, a land classification survey, on irrigable project lands below the dam site. By 1947 he had completed the surveying work and submitted design data and the construction materials report to Reclamation's Denver Office.¹⁶

With preconstruction surveys and investigations completed, Reclamation still held concerns about the high levels of sodium and total dissolved solids (TDS) in the water. A new report, completed in September 1948, raised doubt about the use of project water for irrigation. The sodium concentration in the water neared 75 percent, while the proportion of TDS averaged 1,000 to 2,000 parts per million (ppm). Having tabulated the concentration of sodium and TDS in the water, Reclamation concluded that levels would remain steady even in the reservoir, unless the water level in the reservoir was low, in which case sudden flood waters might dilute the mineral concentration in the water. In general, flood waters would have an "indeterminate" effect on the sodium and TDS levels in a full reservoir.¹⁷ Despite these concerns, progress on the project moved forward.

¹⁶ "Project History," Volume I, 1948, 9-10.

¹⁷ "Project History," Volume I, 1948, 10-11.

Project Authorization

Congress authorized the project by the Flood Control Act of December 22, 1944, ch. 665 of 58 Stat. 887, Public Law 78-534, which accepted the comprehensive plans of the Bureau of Reclamation and the Corps of Engineers for development of the Missouri River basin.

Construction History

In fall 1947 Reclamation appointed D. M. Forester as construction engineer and began preconstruction work on the government camp in Lemmon, South Dakota. The camp consisted of twelve portable housing units situated on a small plot of land within the Lemmon city boundaries. In July 1948 the Fogg and Hozworth Construction Company of Miles City, Montana, began work on twenty two- to three-bedroom houses for construction workers. The homes received landscaping and connection to domestic water, sewage, and gas lines. Fogg and Hozworth Construction Company also built the main access road to the dam site.¹⁸

Construction of Shadehill Dam was the only major construction project in the unit. The dam would be modest in size—nearly 13,000 feet in length and 145 feet high—with an active capacity of 81,400 acre feet. The dam and two dikes would be earthfill, but the spillway (except for the unlined emergency spillway that discharges into Flat Creek) and outlet works would be concrete.¹⁹

On December 31, 1948, Reclamation awarded the contract to S. J. Groves and Sons Company of Minneapolis, Minnesota, and J. L. McLaughlin of Great Falls, Montana, for \$5,116,796.75, but did not issue the notice to proceed until April. The

¹⁸ “Project History,” Volume I, 1948, 7-8, 10.

¹⁹ *Project Data*, 997.

contractor then subcontracted out work to various construction companies. William Collins and Sons, Inc., of Fargo, North Dakota, received the subcontract for construction of the dam from station 52/50 to station 149/08 and excavation of the emergency spillway, and C. A. Wagner Construction Company of Sioux Falls, South Dakota, received the subcontract for the spillway, outlet works, and riprap for the dam and dikes. In all, seven subcontractors worked on the dam and reservoir at Shadehill.²⁰

Although the contract allowed 1,000 days for completion, work on the dam progressed faster than anticipated. In 1949 the construction contractor used a subcontractor and its own forces to clear and strip the foundation of the dam. In the meantime, work on the spillway and outlet works proceeded rapidly. Beginning actual construction on July 25, the contractor had fine graded the foundation for the outlet work and placed the concrete by the end of the year.²¹ The next year, according to official project records, construction “progressed satisfactorily without delays, unusual conditions or special problems.” The contractor employed 333 men in June alone. One worker died from construction-related injuries.²² By the start of 1951 the only work remaining was riprap placement on the dam and emergency spillway dike. The entire dam was inspected and accepted as completed on August 15.

Aside from the dam, other construction work had to be done during 1949-1951. Reclamation drilled water supply wells at the dam site, relocated the Seim cemetery, cleared the reservoir site, constructed the dam site camp, surveyed and planned construction of the pumping plant and distribution system, and developed the wildlife

²⁰ “Project History,” Volume II, 1949, 11-12.

²¹ “Project History,” Volume II, 1949, 12, 18.

²² “Project History,” Volume III, 1950, 10-12, 17.

habitat area.²³ One of the main ongoing projects was the acquisition of land and land rights in the project area. In 1947 Reclamation acquired 3,379 acres for dam and reservoir right-of-way. The next year court action and condemnation proceedings briefly delayed right-of-way acquisitions, but by the end of the year Reclamation had acquired the remaining twenty-eight parcels for right-of-way. An agreement was also reached with the county that enabled the United States to acquire a portion of the Seim road. In return the county received \$29,000 and the right to relocate Seim bridge, which otherwise would have been inundated.²⁴

On April 15-20, 1950, heavy rainfall flooded the Grand River, resulting in over one million dollars in estimated damages. Planners had thought that the temporary diversion channel constructed the previous year was adequate for high flows, but the flood deepened the channel and eroded a portion of the right abutment adjacent to the diversion channel. The flood was the largest in recent history and did considerably more damage than the average \$34,650 in annual damages, or about \$6 per square mile of watershed.²⁵ The high flows of April 1950 did not much delay construction activities, but to the farmers and water developers it must have been a harsh reminder of the power of the river and of the necessity for a flood control structure.

Post-Construction History

In preparation for the operation and maintenance of the dam, access roads, and farm area, Reclamation purchased equipment, seeded portions of government land and the dam, and worked on the rehabilitation of a residence building. The building was

²³ "Project History," Volume IV, 1951, 8.

²⁴ "Project History," Volume II, 1949, 19; "Project History," Volume III, 1950, 17-18, 21.

²⁵ "Project History," Volume I, 1948, 8; "Project History," Volume III, 1950, 21A.

purchased from the Bixby Dam site on the Moreau River just south of the Grand River, relocated to the Shadehill Dam site, and rehabilitated.²⁶

A dam tender living on site had responsibility for maintenance work at the dam and oversight for rent and maintenance of government housing in Lemmon. In the years immediately following the dam's completion, Reclamation oversaw modifications, maintenance, and repairs to the dam and reservoir. High flows damaged riprap around the spillway outlet works and eroded banks of the reservoir. Soil settling at the service spillway caused slight damage to the concrete pipe conduit. In the first few years of operation and maintenance, Reclamation repaired the slide gate hoist, replaced the sewer line to the dam tender's residence, added gravel to the access roads, and eliminated weeds along the dam and in the project area.²⁷

For management and development of recreation and wildlife facilities at the reservoir and adjacent areas, Reclamation, the National Park Service, the Fish & Wildlife Service, and the South Dakota Department of Fish, Game, and Parks signed a memorandum of understanding. The Department of Fish, Game, and Parks apparently assumed the main responsibility for the lake. In 1952 it stocked the reservoir with 220,000 walleye pike fry in May and 1,500 catfish fiddlers in November—and later silver bass and rainbow trout—as well as removed “rough” fish like green sunfish and stonecats from the lake. At the same time, it stocked the shores of the lake with suitable facilities—picnic tables, toilets, boat ramps—on a two-acre area called Merriman Grove.

²⁶ “Project History,” Volume IV, 1951, 9, 14-16, 24.

²⁷ “Project History,” Volume V, 1952, 16-8; “Project History,” Volume VII, 1954, 8; “Project History,” Volume IX, 1956, 2, 6; “Project History,” Volume X, 1957, 6.

A new, thirty-year contract was signed by the Department of Fish, Game, and Parks on November 22, 1958.²⁸

In 1950 the City of Lemmon petitioned Reclamation for municipal water from the Shadehill Unit. Accordingly, Reclamation initiated surveys to determine costs, payments, benefits, and probable water needs of the city, and compiled the findings in a report titled, "Report on Municipal Water Supply for City of Lemmon, South Dakota." The regional and district offices even put together some design work for the pumping plant and pipeline needed to convey reservoir water to the city. After the release of the final draft of the report in 1952, Reclamation tried to discuss possible construction of the facilities with the city, but no meetings were ever held because city officials did not feel ready to consider the plans.²⁹

Reclamation may have been willing to entertain the possibility of municipal water supply because the water from the reservoir was mostly unsuitable for agriculture. Because of lingering concerns about the hard minerals found in the water, project officials delayed the surveys and plans for the distribution system and instead funneled resources to a development farm to test the suitability of the water for irrigation. Soil, water, infiltration, and demineralization testing continued, but the development farm offered a real-life simulation of how soil and crops may react to saline water. Representatives of the Regional Salinity and Rubidoux Laboratories, U.S. Department of Agriculture, Bureau of Plant Industry, South Dakota State College, and Reclamation met to hammer out the details of the farm on February 13, and April 9, 1951. Having

²⁸ "Project History," Volume V, 1952, 24-5; "Project History," Volume VI, 1953, 19; "Project History," Volume VII, 1954, 11; "Project History," Volume X, 1957, 8-9.

²⁹ "Project History," Volume III, 1950, 9; "Project History," Volume IV, 1951, 9, 10-11; "Project History," Volume V, 1952, 10-11.

officially approved the farm in May, Reclamation readied for operation the forty-acre tract of land on the terrace just above the Grand River valley. The water for irrigation would be provided by a pipeline from the outlet works.³⁰

On January 21, 1952, Reclamation worked out an agreement with the South Dakota State College of Agriculture and Mechanic Arts' Agricultural Experiment Station for operation of the development farm. Soil samples at the farm were tested in a laboratory in Huron. The primary goal of the tests was to establish the relationship between soil and water with different levels of sodium concentration. The tests showed "the increase of exchangeable sodium in all irrigated plots to be highly significant." In other words, as sodium is exchanged, more sodium builds up in topsoil than in the subsoils and is therefore bad for crops.³¹

The tests continued through the 1950s and cumulatively concluded the viability of irrigation at Shadehill. Indeed, an early finding was that the farm plot produced a higher hay yield on irrigated lands than on non-irrigated lands. Reclamation concluded that the project was feasible if "satisfactory infiltration rates could be maintained in the field" and that exchangeable sodium levels could be reduced by "simple leaching with Reservoir water"—that is, adding gypsum to the water at the point of diversion. Even still, the latest data in 1959 "indicated a definite trend toward equilibrium between the irrigation water applied and the exchangeable sodium accumulation in the soil." Nevertheless, the

³⁰ "Project History," Volume II, 1949, 10; "Project History," Volume IV, 1951, 9, 10, 29.

³¹ "Shadehill Development Farm Annual Report, 1952," in "Project History," Volume V, 1952, appendix; "Shadehill Development Farm Annual Report, 1954," in "Project History," Volume VII, 1954, appendix.

project manager in Huron noted in his evaluation the need for additional field studies to determine the viability of irrigation on the Shadehill Unit.³²

The actual use of project water for its intended use—irrigated agriculture—has been and remains modest. Of the 3,000 arable acres, farmers irrigated 2,420 acres in 1977.³³

A major use of project water is for recreation. No small pond, at elevation 2772 feet the lake extends 10.2 miles up the South Fork and eight miles up the North Fork of the Grand River, providing plenty of recreational opportunities for boaters, anglers, and picnickers. Roughly 22,000 visitors enjoyed the lake in the first full year of operation, and then dropped to 10,000 in 1954. Reclamation logged 90,000 visitations in 1960. Fishing and boating were the greatest attractions. In 1955 the Lemmon American Legion and Shadehill Boating Club began sponsoring an annual boat derby on the lake, an event attended by several hundred people. The area has seen so much use that after an inspection of the reservoir the National Park Service and South Dakota Department of Game, Fish, and Parks recommended installing additional picnic tables, fire grates, trash cans, toilets, boat ramps, and wells for drinking water.³⁴

The primary benefit of Shadehill Dam is flood control. Of the total capacity of 357,382 acre feet at reservoir elevation 2302 feet, 217,708 acre feet was designed for flood control, 81,443 acre feet was conservation space, and 58,231 acre feet was dead

³² “Shadehill Development Farm Annual Report, 1958,” in “Project History,” Volume XI, 1958, Appendix, 2; “Shadehill Development Farm Annual Report, 1959,” in “Project History,” Volume XII, 1959, Appendix, 2.

³³ *Project Data*, 1000.

³⁴ “Project History,” Volume V, 1952, 24-25; “Project History,” Volume VII, 1954, 11; “Project History,” Volume VIII, 1955, 12; “Project History,” Volume XI, 1958, 7; “Project History,” Volume XIII, 1960, 15; U.S. Department of the Interior, Bureau of Reclamation, *Shadehill Reservoir 1993 Sedimentation Survey*, by Ronald L. Ferrari of the Technical Service Center, Denver, Colorado, September 1995, 1.

space. Reclamation estimates that, as of 1998, the dam has reduced flood damages on the Grand River by \$8.8 million.³⁵

In 1988, after seven years of evaluation and analysis, Reclamation completed the SEED (Safety Evaluation of Existing Dams) Report for Shadehill Dam. Although the SEED team initially noted that the dam “appears to be structurally sound and in satisfactory condition,” it assigned the dam a safety classification of “conditionally poor” until further information could be made available. The report noted the danger of the cliffs facing the dam eroding “which could cause overtopping of or damage to the dam and its appurtenances,” and the inadequacy of the dam to accommodate high flood waters before overtopping. Nevertheless, despite these conclusions, subsequent evaluations and analyses found the dam to be in satisfactory condition and in need of no major modifications.³⁶

The problem of bank erosion and sediment accumulation at the reservoir was serious enough that Reclamation surveyed the underwater area of the Shadehill Reservoir to calculate the volume of storage water lost since the dam’s construction. The reservoir lost an estimated 11 percent in volume, or 15,241 acre feet after dam closure in July 1950. With this information, Reclamation then went on to establish plans for future monitoring of storage loss and gathering of data to create a topographic map of the reservoir. As part of the Shadehill Lake Protection Project, sponsored by the Perkins County Conservation District and funded by federal, state, and local agencies, the surveys

³⁵ *Shadehill Reservoir 1993 Sedimentation Survey*, 2; U.S. Department of the Interior, Bureau of Reclamation, “PSMBP, Grand Division, Shadehill Unit, South Dakota,” <http://www.usbr.gov/dataweb/html/shadehill.html#benefits>.

³⁶ U.S. Department of the Interior, Bureau of Reclamation, Division of Dam Safety, *SEED Report on Shadehill Dam, Pick-Sloan Missouri Basin Program, South Dakota, Missouri Basin Region*, Denver, Colorado, 1988, Section C-3 – Report for Examination No. 3, 2-3; Section A – Management Summary, 1, 2.

were a part of a larger project to reduce crop land erosion in the unit area, rehabilitate crop and range lands, and improve water quality in the reservoir.³⁷

Conclusion

The Shadehill Unit is a modest-sized, little known water project designed to provide irrigation, flood control, and recreation benefits to Perkins County in South Dakota. The project contributes to flood control and recreation on the Grand River and plays a modest role in providing water for irrigation to farmers. However small, the Shadehill Unit contributes to the massive program to harness the waters of the Missouri River basin for the benefit of man.

Yet the Pick-Sloan Program is not without its problems or critics. The water projects do not always entirely solve questions of water scarcity and allocation. They also raise questions about the natural state of our rivers and biotic communities they support. For years, the dominant perception was that the rivers were a commodity that had to be channeled and harnessed to serve man. This was the sentiment that drove passage of the Pick-Sloan Plan in 1944 and construction of the Shadehill Unit. In more recent decades that sentiment has run head-on into the idea that big dams in particular have disrupted the physical environment and the human perception of the Missouri River. In recent years Reclamation has had to balance these competing values and interests as it develops and manages water resources in an economically and environmentally sound manner during the twenty-first century.

³⁷ *Shadehill Reservoir 1993 Sedimentation Survey*, Abstract, 2-3.

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