

RECLAMATION

Managing Water in the West

Projects and Offices of the Great Plains Region



Department of the Interior
Bureau of Reclamation
Great Plains Region

Who We Are

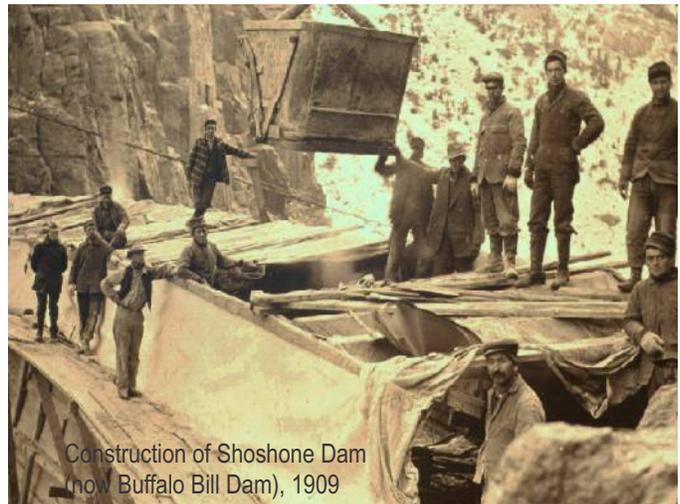


The Great Plains Region

The Bureau of Reclamation

In the mid-nineteenth century there were few reliable water supplies in the western United States. While the completion of the transcontinental railroad in 1869 facilitated the settlement of the West, it did not govern the settlement. The availability of water did, and Mother Nature simply couldn't keep up with the demands of the great western migration.

At the turn of the century, national leaders realized that adequate and reliable water supplies were needed before the parched West could be "reclaimed"—that is, brought into agricultural production. The administration of President Theodore Roosevelt created the Reclamation Service as part of the U.S. Geological Survey. June 17, 2002, marks the 100th anniversary of the creation of the agency and begins a year-long observance of its centennial year. In 1907 the agency obtained "Bureau" status and in 1923 officially became the Bureau of Reclamation.

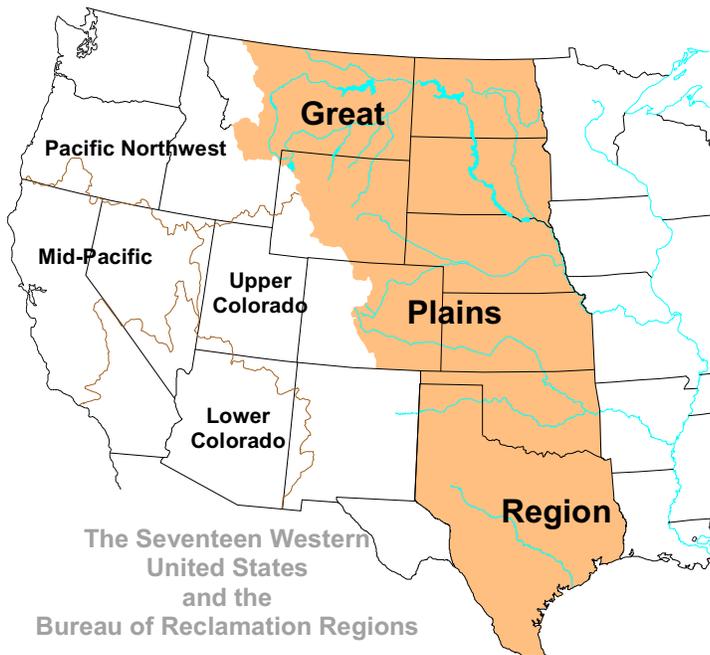


Construction of Shoshone Dam (now Buffalo Bill Dam), 1909

After constructing dams and reservoirs throughout the 17 western states,

Reclamation's initial mission of providing water to the arid West has proved a great start. Today, Reclamation is the nation's largest wholesale water supplier, administering 348 reservoirs with a total storage capacity of 245 million acre-feet (an acre-foot, 325,851 gallons of water, supplies

enough water for a family of four for one year). Reclamation delivers 10 trillion gallons of water to about 28 million people and irrigates 10 million acres of farmland (about one-third of the irrigated acreage in the West). Reclamation is also the fifth largest electric utility in the 17 western states. Reclamation's 58 hydroelectric powerplants provide an average of 60 billion kilowatt hours of energy each year, generate nearly a billion dollars in power revenues, and serve six million homes. About 90 million visitors enjoy Reclamation's 300 recreation sites each year. From the small, remote reservoir providing a near-wilderness experience, to those that have highly developed facilities, Reclamation has something to offer everyone.



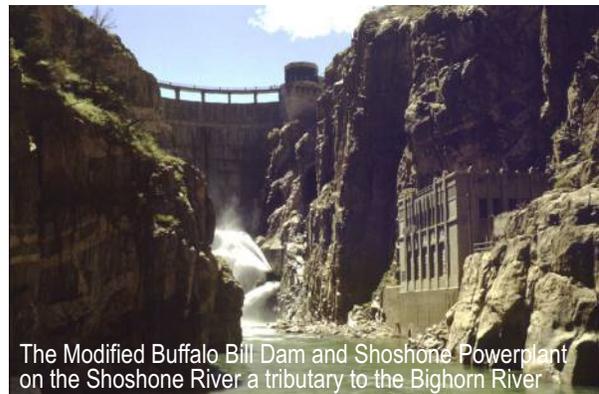
The Seventeen Western United States and the Bureau of Reclamation Regions

The Great Plains Region

The Bureau of Reclamation’s Great Plains Region stretches from the vast wheat fields that spread across northern Montana and North Dakota to the bayous and marshes of the Texas Gulf Coast. From west to east the Region extends from the high peaks of the Rocky Mountains to the prairies west of the Missouri River. The region encompasses all or portions of nine states including Montana, North Dakota, South Dakota, Wyoming, Colorado, Nebraska, Kansas, Oklahoma, and Texas. Some of the great river drainages of America originate in the region and every year millions of migrating birds traverse the Central Flyway which extends north and south through the region.

History

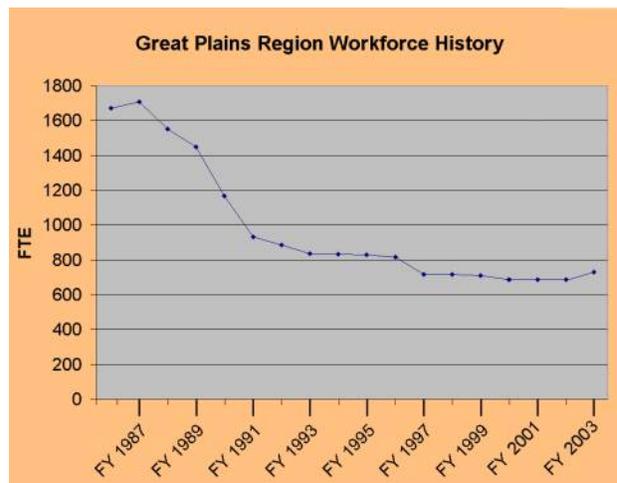
Many of the first projects built by Reclamation were in what is now the Great Plains Region. The region has its roots in three former Reclamation regions: the Upper Missouri Region headquartered in Billings, Montana; the Lower Missouri Region headquartered in Denver, Colorado; and the Southwest Region headquartered in Amarillo, Texas. In October 1985 the Upper and Lower Missouri regions were merged into the Missouri Basin Region with headquarters in Billings. In 1988 much of the Southwest Region was added to the Missouri Basin Region and the region’s name was changed to the Great Plains Region. Geographically, it became the largest of the five Reclamation regions.



Organization

The Great Plains Region is managed from a regional office in Billings, Montana, and six area offices. The Regional Director in Billings is assisted in managing the region by a Deputy Regional Director, Assistant Regional Director, and six Area Managers. This group comprises the Regional Leadership Board which makes policy and budget decisions and sets the vision and goals for the region. There are about 750 employees in the region.

The Area Managers are responsible for managing Reclamation programs and facilities in geographic areas that lie within one or more river drainages. The Montana Area Office, headquartered in Billings, Montana, manages facilities in the upper Missouri River Basin within Montana. The Dakotas Area Office in



Bismarck, North Dakota manages facilities of the upper Missouri River Basin in North Dakota and South Dakota as well as Keyhole Reservoir in eastern Wyoming. The Wyoming Area Office in Mills, Wyoming, is responsible for projects and programs in the Bighorn River drainage (in Wyoming) and North Platte River drainage (in Wyoming and Nebraska). The Eastern Colorado Area Office in Loveland, Colorado, manages Reclamation projects and facilities in the Upper Colorado River drainage and Fryingpan River drainage on the west slope of the Rockies which serve as source water for transmountain diversions to the East Slope of the Rockies in the South Platte and Arkansas River drainages. The Nebraska-Kansas Area Office manages facilities on tributaries of the Missouri River in both Nebraska and Kansas, as well as Bonny Dam and Reservoir in eastern Colorado. The Oklahoma-Texas Area Office is responsible for facilities and activities in the Arkansas River basin in Kansas, the Canadian River basin in Oklahoma and Texas, the tributaries of the Red River Basin in Oklahoma and the river basins of Texas which drain into the Gulf of Mexico.

The Projects

In the Great Plains Region there are 80 Reclamation reservoirs with a total capacity of 22.9 million acre-feet of water. The reservoirs irrigate over 2 million acres of cropland, about one-fourth of the land area served by all Reclamation reservoirs in the West. The farmland served by Reclamation water produces nearly \$1 billion worth of crops each year in the region.

The existing Reclamation projects in the Great Plains Region also provide drinking water to a rural and urban population of about 2.2 million people. In addition, the region has an active rural water development program. Projects completed or under construction under the rural development program will serve an additional 108,000 people, many of whom are on the Indian reservations of North Dakota and South Dakota.

There are 21 powerplants in the Great Plains Region, about 36 percent of the Reclamation total westwide. The plants have a total of 44 generating units (3 of which are pump generators) with a total generating capacity of 992 megawatts of power which represents about 7 percent of Reclamation's total power generating capacity. The powerplants in the region produce enough electricity to meet the needs of a quarter million households.

There are 81 recreation areas associated with reservoirs in the Great Plains Region, which receive an average of 14 million visits each year.

The Major River Systems of the Great Plains Region

Missouri River

The Missouri River is America's longest river and its basin encompasses roughly one-sixth of the land area of the 48 contiguous United States. The basin is larger than the Colorado and Columbia basins combined. All or portions of seven of the Great Plains Region's nine states lie within the Missouri River Basin.

Pick-Sloan Missouri Basin Program

Most of the water and power facilities in the Missouri River Basin were constructed under the Pick-Sloan Missouri Basin Program (Pick-Sloan), authorized by the Flood Control Act of 1944. Pick-Sloan is one of the most extensive plans ever developed for management of an entire river basin.

Pick-Sloan brought together a flood control and navigation plan for the basin which had been developed by the Army Corps of Engineers and an irrigation and hydroelectric plan prepared by the Bureau of Reclamation. The two plans together formed a comprehensive approach which addressed the full spectrum of multiple-purpose benefits including irrigation, hydroelectric power, flood control, navigation, sediment abatement, fish and wildlife enhancement and pollution control. Municipal and industrial water benefits were ultimately added to the program.



As originally envisioned, there were to be over 100 dams. Irrigation was to be provided to 4.8 million acres of farmland in six states. Seventeen hydroelectric facilities were envisioned. The Missouri River was estimated to be capable of handling barges which would carry 20 million tons of river freight each year. While considerable development has taken place under Pick-Sloan, much of that originally envisioned has never occurred.

To date only 518,356 acres have been developed for irrigation under Pick-Sloan mainly because much of the original acreage was later determined not to be suitable for irrigation and because social and economic conditions have changed dramatically since 1944. In addition, there have been increased legal and regulatory requirements which contributed to increased construction costs. Of the 17 Pick-Sloan powerplants originally identified, three have been built by Reclamation and three by the Corps of Engineers. Other powerplants have been developed as part of other multiple purpose projects which have been added to the Pick-Sloan Program. The actual total installed capacity of 2,535,000 kilowatts is more than double the planned capacity of 1,153,267 kilowatts. The Army Corps of Engineers estimates that since records were first kept, Pick-Sloan facilities have prevented more than \$3 billion of flood damages.

Thomas Jefferson was keenly interested in the Missouri River system and its potential as a practical transportation link between the Louisiana Territory and the “Oregon Country” which had previously been claimed by the U.S. During their journey of 1804 through 1806, Lewis and Clark traversed the entire length of the river. While it never became the east-west link that some had hoped, the river plays a major role in the economies and politics of the states through which it passes.

The Great Plains Region will join the rest of the nation in marking the bicentennial of the Lewis and Clark Expedition during the years 2003 to 2006. An estimated twenty-five million travelers will camp/drive/bike/paddle/ ride/walk in the explorers' footsteps. The Bureau of Reclamation is joining with numerous other local, state and federal agencies and organizations in an expansive four-year, American grassroots effort to observe the anniversary of this hallmark event.



Much of the water in the region comes from Rocky Mountain snowfall

Tributaries of the Missouri

There are five significant river systems which are tributary to the Missouri; the Milk, Yellowstone, Cheyenne, Platte, and Kansas. There are 51 Reclamation reservoirs and associated facilities and projects in the five tributary river basins.

1. Milk River

The northernmost tributary of the Missouri is the Milk River. It rises in the Blackfeet Indian Reservation in the Rocky Mountain foothills of northwestern Montana and flows northeastward into Alberta, Canada. It then bends southeastward to re-enter Montana. The river then flows in an easterly direction across the state to enter the Missouri River a few miles northeast of the Fort Peck Dam and Reservoir. There are three Reclamation dams and reservoirs on the Milk.

2. Yellowstone River

The Yellowstone River is another major tributary to the Missouri. The system, which passes through some of the country's most scenic areas, drains 70,000 square miles. While there are no major dams and reservoirs along the entire length of the main Yellowstone, there are smaller diversions which provide irrigation water and there are large Reclamation dams and reservoirs on its tributaries.

The Bighorn River is the largest tributary of the Yellowstone, draining west-central Wyoming and a small area of south-central Montana. Topographically, it includes three subbasins, in downstream order, the Wind River in Wyoming, the Big Horn in Wyoming and Montana, and the Lower Big Horn in Montana. After a course of 461 miles, it drains into the Yellowstone about 50 miles northeast of Billings, Montana. Reclamation has five reservoirs on the Bighorn and its tributaries.

3. James River

The James River rises in central North Dakota. It flows in a south, southeasterly direction through North Dakota and South Dakota and enters the Missouri near the town of Yankton on the South Dakota-Nebraska border. The basin covers about 22,000 square miles. Reclamation operates Jamestown Dam on the river near the town of Jamestown, North Dakota.

4. Cheyenne River

The Cheyenne River forms in northwest Wyoming then flows into and across the middle of South Dakota to join the Missouri River near Pierre. The 527-mile-long river drains 25,000 square miles. Its main tributary is the Belle Fourche River which also rises in far northwest Wyoming. There are four Reclamation dams and reservoirs on the river or tributaries.

5. The Platte River

The Platte River system includes the North Platte, South Platte and Central Platte River. The South Platte rises out of the Mosquito Range of central Colorado and flows southeast. It flows through Denver to Greeley, where it bends eastward into Nebraska. There it joins the North Platte River after a course of 442 miles. The North Platte rises in several head streams in the mountains of north-central Colorado then flows north into Wyoming, bends east-southeast at Casper, and continues into western Nebraska. After a 680-mile course, it joins the South Platte River to form the Platte River. The Central Platte River is 310 miles long, but measured from its longest source stream, the entire Platte system has a combined length of 990 miles. The Platte flows southeast into a big bend at Kearney, Neb., turns northeast, and empties into the Missouri River 15 miles south of Omaha. The Loup River is the largest tributary to the Platte. The Platte drains an area of 90,000 square miles. There are 19 Reclamation dams and reservoirs on the Platte River system.



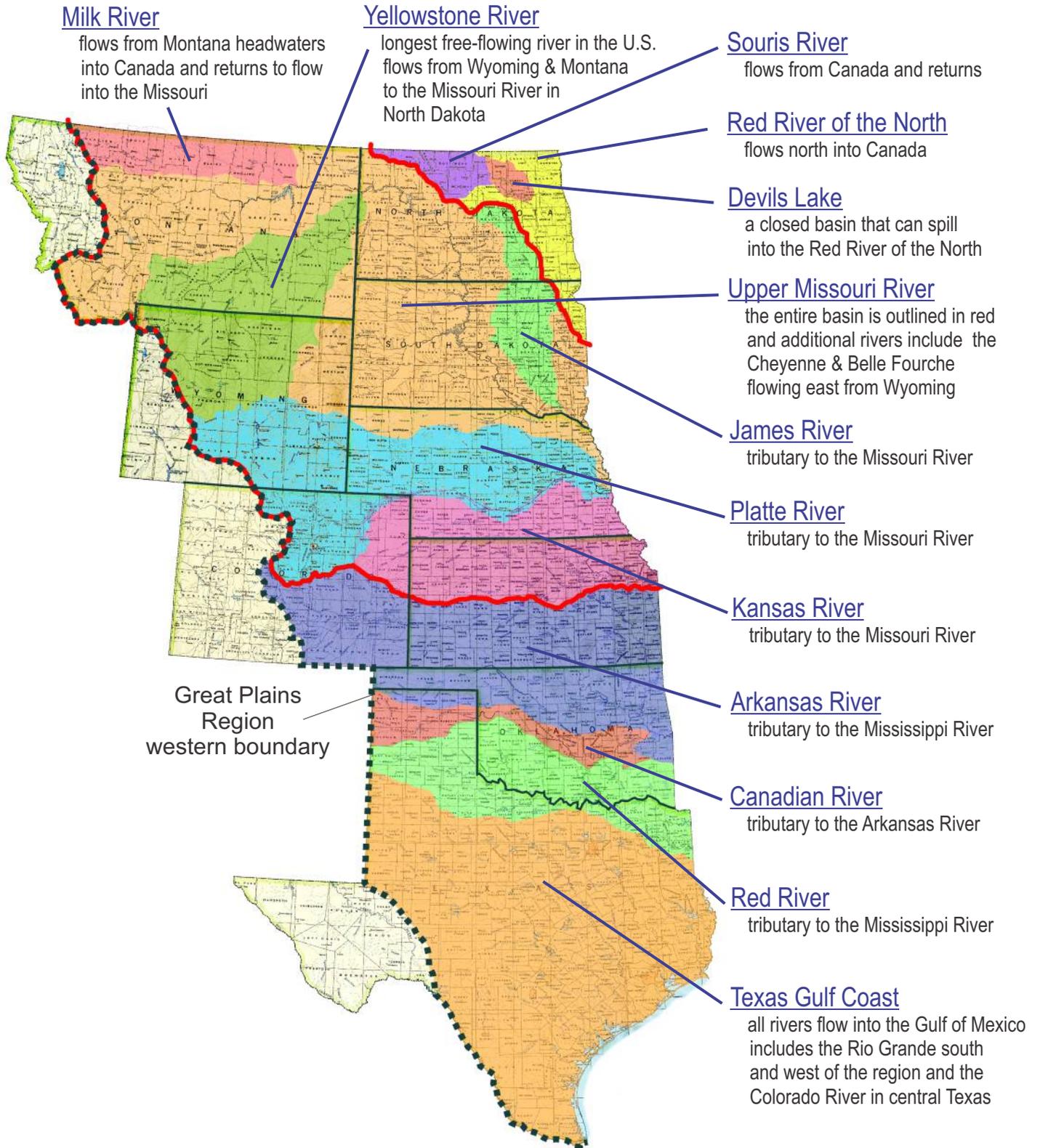
Waterfowl take flight from Platte River wetlands during fall migration on the Central Flyway

5. The Kansas River

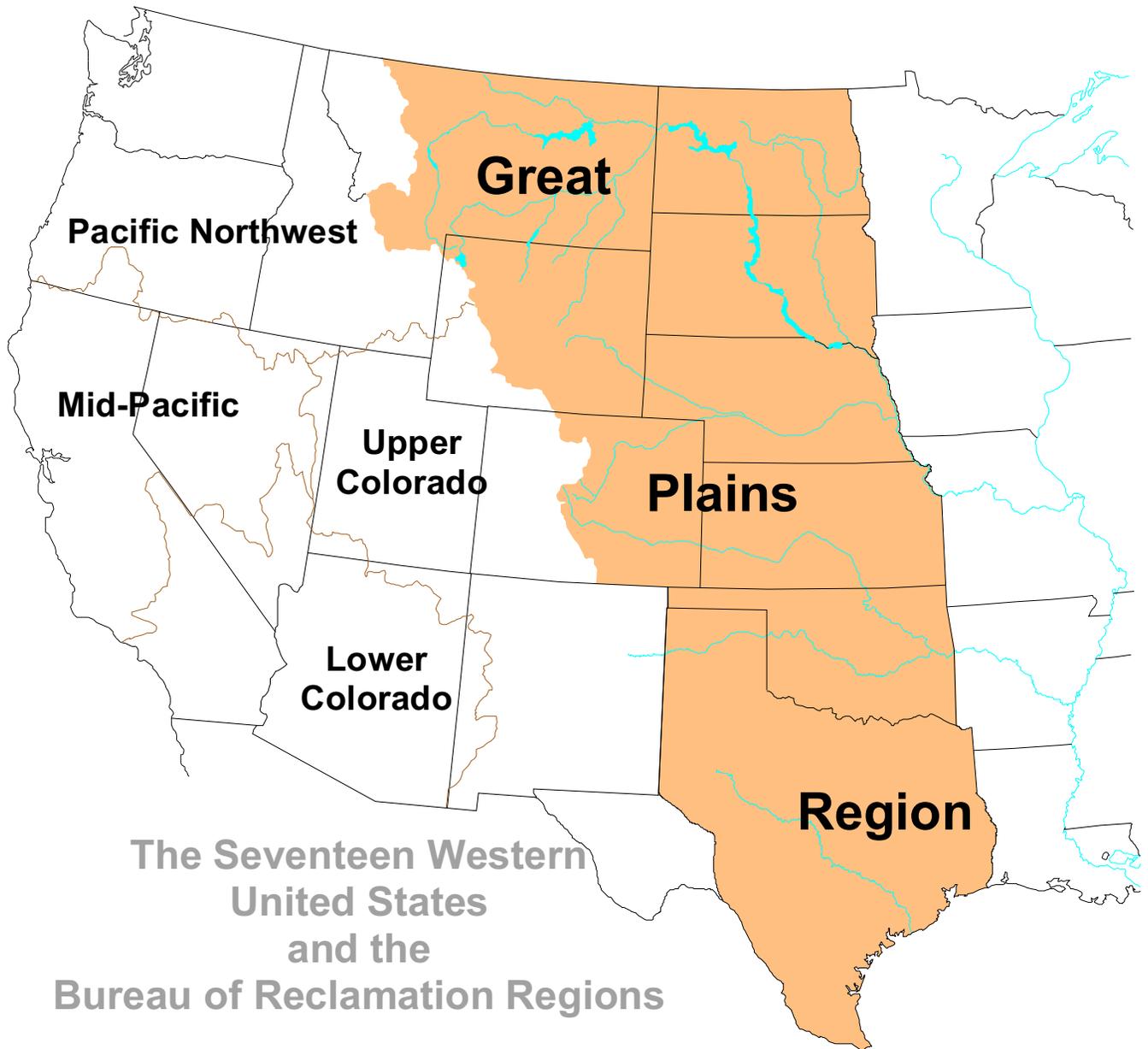
The Kansas River originates in northeastern Kansas. It is formed by confluence of the Republican and Smoky Hill rivers at Junction City and joined by the Big Blue River near Manhattan. Flowing east into the Missouri River at Kansas City, it drains an area of 61,300 square miles, including northern Kansas and parts of southern Nebraska and eastern Colorado. Reclamation has 11 dams and reservoirs on the Republican, Smoky Hill and the Solomon, which is a tributary to the Smoky Hill.

Great Plains Region

Major River Basins



What We Provide



What We Provide

The Reclamation Act of 1902 authorized creation of the agency that would eventually become known as the Bureau of Reclamation. The law directed the “construction and maintenance of irrigation works for the storage, diversion and development of water for reclamation of arid and semiarid lands” in the sixteen western states. Texas was later added as the 17th Reclamation state.

While providing water for irrigation was the primary purpose for the creation of Reclamation, other project purposes were added over time. Those are: flood control, hydropower, municipal and industrial water, recreation, and fish and wildlife management.

Irrigation

Soon after the passage of the Reclamation Act, the agency began planning, designing and building water storage and delivery facilities. The basic premise was that federal funds would be used to build the projects, but water users who benefitted from them would repay the government certain costs of construction and operation and maintenance. Users entered into long-term repayment contracts with the



Shoshone Project, Wyoming, irrigated land

federal government. These financial relationships between Reclamation and project beneficiaries are unique and result in federal, state and local partnerships that meet multiple public needs.

In the Great Plains Region there are 80 storage dams and 63 diversion dams. More than 14,000 farms, irrigating a total of 2.2 million acres, receive water from Reclamation facilities in the Region. The value of crops produced annually on those lands is nearly \$1 billion.

Flood Control

Historically, Reclamation projects were not built for flood control, even though this is one of the many benefits provided by the water storage facilities. The Reclamation Project Act of 1939 expressly authorized that flood control could be included as a project purpose. Since flood control records were kept, Reclamation facilities have prevented more than \$8 billion in flood damages in river basins throughout the West.

Hydropower

Although the earliest Reclamation hydroelectric plants went into operation in 1909, it was only in the 1930's when policy emerged to guide federal development of large hydroelectric projects. The Reclamation Project Act of 1939 provided authority to the Secretary of the Interior to contract for project power and to include power revenues in the repayment of project costs.

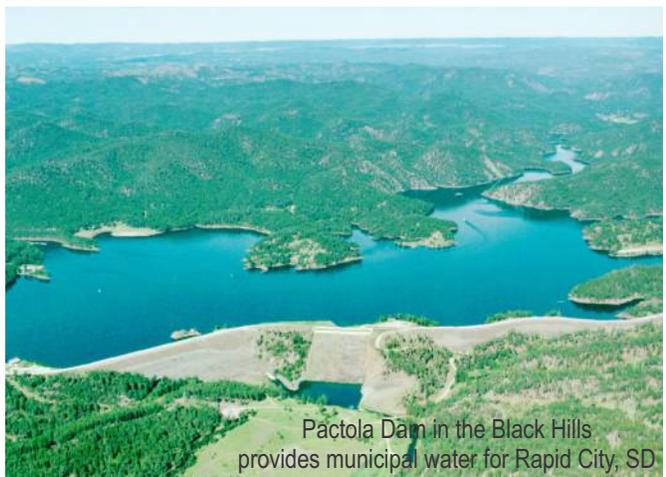
Today, Reclamation is the nation's second largest hydroelectric power producer with 58 hydroelectric powerplants having an installed capacity of over 14,000 megawatts. The Great Plains Region manages 21 of those powerplants with an installed capacity of about 1,000 megawatts. Westwide Reclamation's power plants generate over 42 billion kilowatt hours of hydroelectric energy every year, enough to meet the needs of 14 million people. Powerplants in the Great Plains Region produce about 3.1 billion kilowatts each year, enough for about a quarter million people. Prior to 1978, Reclamation both generated and marketed the federal power produced at its facilities. In 1978 the act creating the Department of Energy transferred the power marketing and transmission functions to newly established power marketing administrations. In the Great Plains Region power excess to project needs is marketed by the Western Area Power Administration.



Municipal and Industrial Water

The Town Sites Act of 1906 authorized Reclamation to sell water for municipal uses if it was surplus to project needs. The Reclamation Project Act of 1939 officially added municipal and industrial uses as an authorized purpose of Reclamation projects and allowed those uses to share in repaying the cost of building the projects. Municipal, industrial and rural water projects in the Great Plains Region serve over two million people. 300,000 acre-feet of water is delivered annually for municipal and industrial uses in the Region.

In addition to providing water from Reclamation projects, the Great Plains Region's planning program provides technical assistance to States and other water management entities on a cost-shared basis (normally 50-50) to study water needs. Often project sponsors decide to pursue the development of a rural water project, but to do so they must get specific legislative authority.



In recent years several pieces of specific legislation were passed authorizing Reclamation to design and build water systems that serve rural areas and small municipalities. These projects include WEB, Mid-Dakota, and Perkins County Rural Water System in South Dakota, the Lewis and Clark Rural Water System which will serve areas of South Dakota, Iowa and Minnesota, and the municipal, rural and industrial component of the Garrison Diversion Unit in North Dakota. Once these projects are completed, the beneficiaries themselves are responsible for the ongoing operation and maintenance expenses and ownership of the projects remains in local hands.

Recreation

Even in the early days of Reclamation when a new reservoir was filled, the public would soon arrive to use it for recreation purposes. However, it wasn't until the Reclamation Project Act of 1939 that recreation was added as one of the recognized purposes of Reclamation projects. The Federal Water Project Recreation Act of 1965 deemed there is a federal responsibility to provide safe and healthy opportunities for public recreation at Reclamation projects.

In the Great Plains Region there are 81 recreation areas at Reclamation reservoirs which receive more than 14 million visits each year. Most of the recreation areas are managed by Reclamation partners such as the U.S. Forest Service or state game and parks agencies. A major goal of the agency's recreation program is to develop partnerships with non-Federal entities such as states, tribes, and private interests, to share the cost of recreation projects.



Fish and Wildlife

For many years Reclamation projects were built after they were deemed to be feasible from an engineering and project repayment standpoint. It wasn't until the passage of the Fish and Wildlife Coordination Act of 1956 that proposed Reclamation projects had to be weighed against potential impacts to fish and wildlife.

The Great Plains Region's fish and wildlife program today evaluates the impacts of Reclamation project operations on fish and wildlife habitat, particularly threatened and endangered species, and on wetlands. It also provides funding and administrative support for fish and wildlife management in general. A major function of the program is to develop partnerships with non-Federal natural resource conservation groups, including states, tribes, and private interests, to share the cost of fish and wildlife projects and studies.

FY2002 was the eleventh year for the Great Plains Region's wetland development program. Since its inception, the region has contributed to 144 collaborative projects aimed at environmental enhancement, focusing on the Central Flyway which provides breeding habitat in

North Dakota and Montana, migration habitat in Nebraska and Oklahoma, and winter habitat in Texas.

Native American Affairs

The Secretary of the Interior has special trust responsibilities toward American Indians and Alaska Natives. One of the Bureau of Reclamation's major program goals is to assist Native American tribes to develop and manage their water resources. There are 65 federally recognized tribes in the Great Plains Region. Most of these tribes have a critical need to develop and manage their water, but they are hampered by both a lack of water and a lack of infrastructure.

The Region's Native American Affairs Program has two primary activities; support for Department of the Interior Indian water rights settlement and implementation teams and technical assistance and training for tribes in the Region. A wide range of technical assistance activities have been accomplished. The main activities are helping tribes assess their domestic water supply and treatment needs and then identifying potential solutions to meet those needs. As an example, the Bureau of Reclamation signed a Memorandum of Agreement with the Mni Sose Intertribal Water Rights Coalition under which the agency assists the tribes as they work to put the infrastructure into place to help deal with their own water issues. The coalition represents 27 tribes in the Missouri River Basin.

Since the 1980's, legislation was passed authorizing Reclamation to develop a number of water supply projects to serve the needs of rural residents and rural communities on Indian reservations. These projects are in North Dakota, South Dakota, and Montana. In each case, the legislation directed that the federal government is responsible for 100 percent of the annual operation and maintenance costs.

Support Activities

Operation and Maintenance

The heart of the Reclamation program in the Great Plains Region is the day-to-day operation and maintenance of the many water storage and delivery facilities spread over its nine-state area. They are operated to achieve the purposes outlined in authorizing legislation and in accordance with other laws and treaties with Native American tribes.



Construction on the Mni Wiconi Rural Water Project that serves the Pine Ridge Reservation

It is Reclamation policy to transfer the responsibility for operating and maintaining single-purpose facilities to the entities that receive the water from them. About half of the dams and associated facilities in the Great Plains Region are operated by non-Reclamation entities such as irrigation districts or municipalities. Reclamation maintains a partnership with these operating entities, providing oversight and periodically inspecting the facilities and reviewing the entity's practices and operational procedures. Reclamation continues to operate and maintain the other half of the facilities (multiple-purpose projects), working to assure they are efficient and safe.

Safety of Dams

Reclamation's Dam Safety Program is carried out under the authority of the Reclamation Safety of Dams Act of 1978 and amendments made in 1984. Program activities include annual on-site examinations of each dam, regular monitoring of the performance of the dam, and a comprehensive evaluation of the design, construction, and performance of the dam to state-of-the-art standards. The purpose of the Dam Safety program is to ensure that Reclamation structures do not present unacceptable risks to the public's safety, property and welfare. Dams in the Great Plains Region were constructed from the 1900's to the 1980's. The agency implements remedial measures when dam safety issues are identified.

Planning

Reclamation's mission today emphasizes the optimum use of water resources rather than new construction. Reclamation is now more likely to be involved in studies which address the increasing competition for water and improving the efficient use of limited water supplies. The planning program is geared more to providing States, Tribes and other sponsors technical assistance and cost-shared studies which do not necessarily lead to feasibility studies and Federal construction projects. The agency is well positioned to work with customers to provide one-stop services, but because many Reclamation facilities are old, operations and maintenance demands for these facilities compete for the same funds which would be used for new studies.

Water Conservation

The Water Conservation Field Services Program is a relatively new and proactive approach to assisting local water providers such as irrigation districts to encourage efficient water use. Area Office personnel work to help water users - including the 1,000 water districts using Reclamation water - achieve their water management goals. Services are provided in three major areas: 1) the demonstration of conservation (e.g., surge valve loaner program in Nebraska to



help farmers see the benefits of this water management technique); 2) implementation of effective practices (e.g., helping water districts create, fund, and carry out water conservation plans) and 3) funding for cost-shared educational outreach (field tours, workshops, printed materials, on-the-ground educational activities and partnerships). Many water conservation activities are conducted in partnership with other federal, state and local agencies.

Drought Assistance and Planning

Public Law 102-250, passed in March 1992, authorized emergency drought funding and the development of drought contingency plans. Funding has been made available on an “as needed” basis, depending upon climatological conditions. Since the law was passed, Congress has appropriated over \$64 million to the Bureau of Reclamation for drought assistance and planning.

The law is divided into two major parts. Title I allows Reclamation to undertake activities that would minimize or mitigate drought damages or losses in western states. Title II allows Reclamation to assist in the development, modification, or updating of cooperative drought contingency plans in all the states and with Indian Tribes.

Water Quality

In 1972, Congress enacted the first comprehensive national clean water legislation. The Clean Water Act is the primary federal law that protects our nation’s waters, including lakes, rivers, aquifers and coastal areas. The Region’s water quality work includes hydrologic and water quality evaluations associated with planning, design, and resource management. It also involves studying the availability and quality of surface and ground water, determining the suitability of water for irrigation, environmental, municipal, and other uses, and evaluating how management activities affect water quality.

Cultural Resources

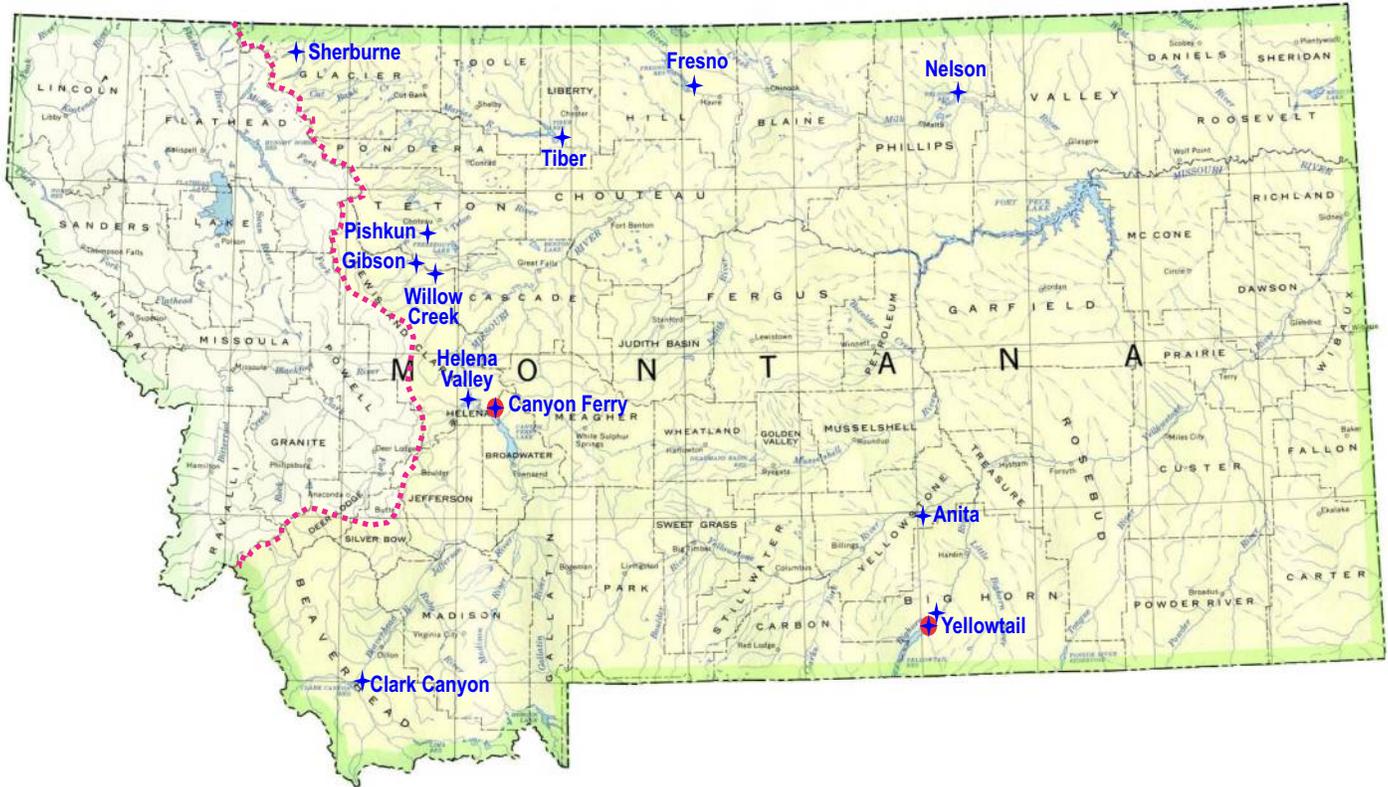
The region’s cultural resource program manages and protects cultural resources on Reclamation lands as well as on lands affected by Reclamation activities. Laws governing cultural resource activities are the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA) and other federal statutes, regulations and policies. Cultural resources include archaeological, historic, and architectural sites and traditional cultural properties. Closely linked to the cultural resource program are the museum property and Native American Graves Protection and Repatriation Act (NAGPRA) programs. Reclamation has two basic categories of NAGPRA responsibilities: 1) inventory and repatriation of human remains and related items which were in Reclamation’s collections prior to passage of NAGPRA in 1990, and 2) consultation with Tribes regarding human remains discovered on or excavated from Reclamation lands after 1990. Reclamation’s museum property are collections of artifacts and documents. The region has an estimated 3.7 million items of museum property, the majority of which are archeological and collected before curation standards were issued. Reclamation has cataloged 1.5 million specimens according to accepted standards and will continue in this effort.

Waste Water Re-Use

The Bureau of Reclamation's water reclamation and reuse program was authorized by the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI of Public Law 102-575). The act, known as "Title 16," directs the Secretary of the Interior to identify and investigate opportunities for water reclamation and reuse. Non-federal partners pay at least 50 percent of feasibility study costs and 75 percent of construction costs.

There are two projects authorized or proposed in the Great Plains Region. In 1998 Congress appropriated funds to review work done on a reuse project by the San Antonio (Texas) Water System. Reclamation completed an initial review, but before it was finalized SAWS requested that Reclamation assist in investigating possible expansion of the project. Two alternatives have been selected for investigation. In 1999 legislation was passed to authorize a project for Denver Water (Colorado) which would treat waste water for irrigation and industrial uses. The bill did not pass in the 106th Congress and has been re-introduced in the 107th Congress.

Montana



Reclamation Storage Dams in Montana

- ✦ Montana Area storage dam
- ⊕ Montana Area storage dam and hydropower generation
- ⋯ Great Plains Region western boundary

The Bureau of Reclamation in Montana

The Montana Area Office (MTAO) in Billings manages Reclamation's facilities and programs in the portion of Montana east of the Continental Divide in drainages that flow into the Missouri River system. There are 13 projects which include 11 dams and reservoirs, 9 diversion dams, 10 pumping plants and 2 powerplants which provide a variety of benefits and meet multiple needs.

The Montana projects provide water to 352,915 acres of land which produce about \$65 million worth of crops each year. Principal crops are sugar beets, hay, corn, wheat and barley. Over 1 million visitor days are spent at Reclamation facilities in Montana each year

Lower Yellowstone Project

Work began on the Lower Yellowstone Project on the far eastern edge of the state in 1905 just three years after the agency was created. The project includes the Lower Yellowstone Diversion Dam, a pumping plant, canal, and associated structures. The purpose of the project is to furnish a dependable supply of irrigation water for about 54,000 acres of farmland along the Yellowstone River. About one-third of project lands are in North Dakota and two-thirds in Montana.

Huntley Project

Water deliveries started in the Huntley Project just east of Billings in 1915. Project works include a diversion dam on the Yellowstone River, canals, laterals, pumping plants, and an offstream storage reservoir. The project can furnish water to irrigate about 30,000 acres.

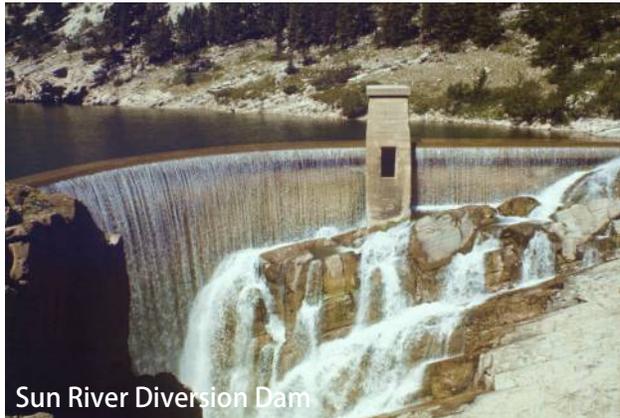
Milk River Project

The Milk River Project along Montana's northern border was started in 1906 and work continued on its various parts into the 1960's. It has three dams and reservoirs and three diversion dams. Lake Sherburne Dam is a 98-foot-high earthfill structure impounding Lake Sherburne which extends into Glacier National Park. Fresno Dam is about 14 miles west of Havre. It is a compacted earthfill dam which is 110 feet high and 2,070 feet long. Nelson Reservoir is impounded by a series of dikes. It is about 15 miles northeast of Malta. The Milk River Project delivers water through 200 miles of canal to about 121,000 acres of land that extend about 165 miles along the river from near Havre to about six miles below Nashua.



Sun River Project

The Sun River project just west of Great Falls was first started in 1907 and all facilities were completed in 1927. Its three reservoirs provide irrigation water, flood control and recreation. The project transports water from the Sun River and its tributaries through a system of nine canals to irrigate about 93,000 acres of land along the Sun River. Facilities include Gibson Dam and reservoir, Pishkun Dikes and Reservoir and Willow Creek Dam and Reservoir. Gibson, the project's principal structure, is a 199-foot-high concrete arch structure about 70 miles west of Great Falls. Pishkun is about 15 miles northeast of Gibson Dam. The reservoir is formed by eight earthfill dikes totaling nearly two miles in length. Willow Creek, about 15 miles southeast of Gibson dam, is a 93-foot-high earthfill structure.



Buffalo Rapids Project

The Buffalo Rapids Project, along the Yellowstone river in eastern Montana, was completed in the late 1930's. Principal structures include five pumping plants that pump water directly from the Yellowstone River and one re-lift pump plant to provide water for 22,719 acres of land in the vicinity of Glendive, Fallon and Terry.

Intake Project

The small Intake Project, completed in the 1940's, includes a pumping plant and an irrigation distribution system serving 823 acres in Dawson County adjacent to the Lower Yellowstone Project. The pumping plant is on the main canal of the Lower Yellowstone Project about 1.5 miles downstream from the town of Intake. Power for pumping is supplied by the Pick-Sloan Missouri Basin Program from the Fort Peck Project by wheeling over facilities of Montana Dakota Utilities (MDU).

The Pick-Sloan Missouri Basin Program in Montana

Considerable development occurred in Montana under the Pick-Sloan Missouri Basin Program. There were seven Pick-Sloan units built, including the large Yellowtail Unit south of Billings and the Canyon Ferry Unit near Helena. Both provide considerable storage for irrigation and power generation and are popular recreation areas. Yellowtail and Canyon ferry powerplants produce about 43 percent of the Great Plains Region's annual power generation, resulting in about \$15 million in revenue each year.

Canyon Ferry Unit

The Canyon Ferry Unit is a multiple-purpose project which makes an important contribution to the power supply, flood control, recreation and irrigation the upper Missouri River Basin. Storage in Canyon Ferry Reservoir provides water to irrigate over 200,000 acres of farmland. Principal storage structures are Canyon Ferry Dam and Powerplant about 17 miles northeast of Helena. The dam is a concrete gravity structure 225 high and about 1,000 feet long. The powerplant houses three 16,667 kilowatt generators.

Crow Creek Pump Unit

The Crow Creek Pump Unit was developed at the request of the Broadwater County Commission to irrigate an amount of productive farmland equal to that inundated by Canyon Ferry Lake. Project features include Crow Creek Pumping Plant, the Toston Tunnel, Toston Canal, Lombard Canal and lateral and drainage systems.



East Bench Unit

The East Bench Unit is in southwestern Montana along the Beaverhead River near Dillon. Principal features include Clark Canyon Dam and Reservoir, Barretts Diversion Dam, East Bench Canal and a system of laterals and drains. The unit provides irrigation water to about 20,000 acres of farmland. Clark Canyon Dam, at the headwaters of the Beaverhead River, is a 147-foot high earthfill structure.

Helena Valley Unit

The Helena Valley Unit is about three miles west of Canyon Ferry Dam on the Missouri River and adjoins the city of Helena. The principal purposes of the unit are irrigation and municipal water for Helena. Features include a tunnel, dam and regulating reservoir, canal, pumping plant and other facilities to furnish water to about 17,000 acres of cropland and the city.

Lower Marias Unit

Located in north-central Montana along the Marias River, the Lower Marias Unit provides water for flood control, recreation, fish and wildlife and municipal water supplies. It also controls floods and makes possible the multiple purpose use of Fort Peck Reservoir downstream. Tiber Dam and Lake Elwell are the principal project features. Tiber Dam is a zoned earthfill structure which stands 205 feet high.

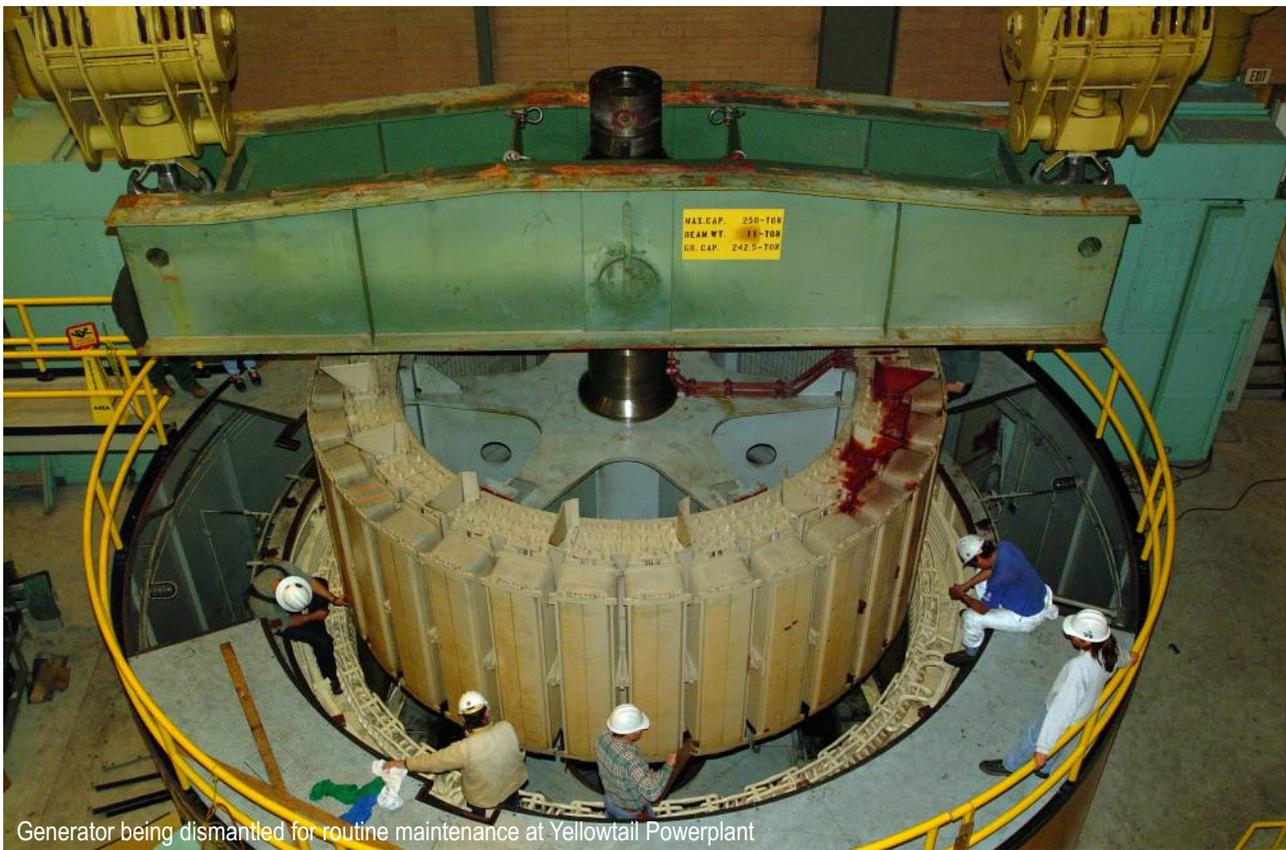
Savage Unit

Principal features of the Savage Unit on the far eastern edge of the state include a feeder canal, pumping plant and main canal. Water is delivered to the pumping plant by means of a feeder canal about 100 feet long extending from the Lower Yellowstone Project Main Canal. There are 2,200 acres of farmland in the Savage Unit.

Yellowtail Unit

Yellowtail Dam and Powerplant, completed in 1967, and Afterbay Dam, completed in 1966, are the principal features of this unit. Yellowtail Dam impounds Bighorn Lake which is 72 miles long when the reservoir is full. The area around the lake has been designated Bighorn Canyon National Recreation Area and offers outstanding scenery and excellent fishing, boating and other recreational opportunities. The recreation area is managed by the National Park Service. The Afterbay is a regulating reservoir which controls releases from

Yellowtail Dam flowing into the Bighorn River. Yellowtail Dam is a concrete thin arch structure which is 525 feet high and 1,480 feet long. Four 12-foot-diameter penstocks through the dam supply water to four 62,500 kilowatt generators. The Afterbay Dam is a 72-foot high concrete gravity structure with two embankment wings.



Generator being dismantled for routine maintenance at Yellowtail Powerplant

North Dakota



Reclamation Storage Dams in North Dakota

✦ Dakotas Area storage dam

The Bureau of Reclamation in North Dakota

The Dakotas Area Office is responsible for administering Reclamation programs in North Dakota and South Dakota. The mission of the office is to provide technical assistance and leadership in the responsible development and management of water and related resources to enhance the quality of life in both States.

The Area Office is located in Bismarck, North Dakota, with two field offices in South Dakota. The Area Office manages nine dam and reservoir facilities, three of which are in North Dakota. They are Dickinson and Heart Butte on the Heart River and Jamestown on the James River, both tributaries to the Missouri.



There are five Indian reservations in North Dakota, including the Standing Rock and Lake Traverse Reservations which both straddle the border of North Dakota and South Dakota, and the Ft. Berthold, Turtle Mountain, and Fort Totten reservations. The Area Office is working with four of these Tribes on various programs or projects.

Programs and projects being conducted by the Dakotas Area Office are very diverse in nature. Many of the activities are associated with the planning, construction, and operation and maintenance of rural water systems. Other activities include operation and maintenance of Reclamation facilities, contract renewals, assistance with irrigation development, water management studies, and water conservation.

Projects in North Dakota provide a water supply to a total irrigated acreage of 22,094 acres. They produce an average of \$2.5 million worth of crops each year. Water from newly constructed municipal, rural and industrial water supply projects now serve over 180,000 people in the state, and ultimately will serve over 400,000 people in as many as 130 communities and rural areas throughout the state and on four Indian Reservations. Over 600,000 visitors participate in recreation activities in Reclamation reservoirs in the state each year.

The Pick-Sloan Missouri Basin Program in North Dakota

Dickinson Unit

Dickinson Dam and Reservoir (Edward Arthur Patterson Lake) was constructed to store water for irrigating valley lands downstream from the dam, and for a municipal water supply for the city of Dickinson, North Dakota. Project water is no longer used as a municipal water supply

since the cities domestic water is now supplied by the Southwest Pipeline Project. In addition, the 106th Congress passed the Dickinson Dam Bascule Gates Settlement Act of 2000 which forgives Dickinson's repayment obligations for the bascule gate which was constructed to provide a municipal water supply. Today, water supply from Dickinson Dam and Reservoir only serves about 400 acres of irrigable lands in isolated tracts along the Heart River near Dickinson, provides water to irrigate a golf course and dilute sewage lagoon releases. Fish and wildlife, recreation, and minor flood control benefits are also provided by the project. Dickinson Dam is a 62-foot-high earthfill structure just southwest of the city of Dickinson.

Heart Butte Unit

The Heart Butte Unit of the Pick-Sloan Missouri Basin Program lies in scattered tracts along the Heart River from Heart Butte Dam to the Missouri River. There are about 8,500 acres of land irrigated, including lands served by the Western Heart River Irrigation District and Lower Heart Irrigation Company. Unit features include Heart Butte Dam, 29 river pumping plants, 1 relief plant, and 17 miles of laterals. The dam, which is about 18 miles south of Glen Ullen, is earthfill, 142 feet high and 1,850 feet long at the crest. The reservoir lands and associated recreation facilities are managed by Reclamation.

Jamestown Unit

Jamestown Dam and Reservoir in central North Dakota were originally authorized as part of the Garrison Diversion Unit. The dam is a zoned earthfill structure standing 110 feet high and 1,418 feet long at the crest. The project provides flood protection on the James River and is a major recreation site for residents of the valley. The reservoir lands and associated recreation facilities are managed by the Stutsman County Park Board through an agreement with Reclamation.

Garrison Diversion Unit (GDU)

Work on this project began in 1967. The principal supply works are the Snake Creek Pumping Plant, McClusky Canal, and New Rockford Canal. Reclamation operates and maintains the Snake Creek Pumping Plant. Operation and maintenance of the McClusky and New Rockford Canals is performed by the Garrison Diversion Conservancy District under a cooperative agreement funded by Reclamation.



Progress on the project was sporadic due to environmental and issues and concerns about project water flowing across the border into Canada. These issues ultimately resulted in appointment of a special Secretarial Commission in 1984. The commission was charged with assessing the contemporary water needs of North Dakota and recommending alternatives which could enable the project to proceed.

The Commission's recommendations were the basis of the GDU Reformulation Act of 1986. The act significantly altered the nature of the project by reducing the irrigation component to 131,000 acres, 17,500 acres of which were to be developed on the Fort Berthold, Standing Rock, and Fort Totten Indian reservations. The act also authorized and provided up to \$270 million in Federal funding for significant municipal, rural and industrial water supply development. It also called for establishing a Wildlife Trust and required acre-for-acre mitigation of wetlands impacted by project construction.

Even after the reformulation was enacted, there was disagreement over certain features, and the administration would not support appropriations for the non-Indian irrigation features. The Dakota Water Resources Act (DWRA), which was passed in the final days of the 106th Congress in December 2000, further amending the original Garrison authorization. DWRA

deauthorized all but 75,000 acres of the irrigation originally included in the project and increases construction ceilings for Indian and non-Indian municipal, rural, and industrial (MR&I) water supplies by about \$600 million (\$200 for the State Grant program, \$200 for Indian MR&I, and \$200 million for a Red River Valley Feature). In addition, the act provided an additional \$25 million for the Wetlands Trust Fund and \$6.5 million for recreation..



Snake Creek Pumping Plant on Lake Audubon

GDU State Municipal, Rural and Industrial (MR&I) Program - The Garrison Diversion MR&I program was authorized in 1986 and Congress appropriated \$200 million federal dollars for the planning and construction of water supply facilities throughout North Dakota. The North Dakota State Water Commission and the Garrison Diversion Conservancy District work with Reclamation on this program. Several water supply projects have been constructed to serve the state of North Dakota including the Southwest Area Pipeline serving an area between Lake Sakakawea and the southwest corner of the state. Other large-scale projects planned in the state include the Northwest Area Water Supply (NAWS) and the Red River Water Supply (NAWS). These two water systems are controversial because they divert water from the Missouri River basin into basins flowing north into Canada.

Indian MR&I -The Indian MR&I component of GDU began with the 1986 Garrison Reformulation Act. This act directed the Secretary of the Interior to Aconstruct, operate, and maintain municipal, rural, and industrial water systems...to meet the economic, public health, and environmental needs of the Fort Berthold, Standing Rock, and Spirit Lake reservations@. Although the original funds appropriated for planning and construction have been spent, the Dakota Water Resources Act of 2000 appropriated an additional \$200 million and included funding for an MR&I system on the Turtle Mountain reservation. Reclamation has cooperative agreements for operation and maintenance (O&M) of completed facilities. Funding for the tribal O&M program comes from Reclamation=s yearly O&M budgetary process. These increasing annual OM&R outlays are a concern for Reclamation.

Standing Rock Irrigation - The Garrison Diversion Unit Reformulation Act of 1986 authorized the construction of 2,380 acres of irrigation on the Standing Rock Indian Reservation. The program is managed by tribal staff through a Public Law 93-638 cooperative agreement with Reclamation.

Mitigation and Enhancement Activities - About 60,000 acres have been developed for GDU mitigation and enhancement. Reclamation owns and has developed about 33,000 acres of land in central North Dakota known as the Lonetree Wildlife Management Area. This land was developed for the benefit of wildlife and the general public. The North Dakota Game and Fish Department has partnered with Reclamation in this land development effort and the Game and Fish began managing the area in 1994. Reclamation also holds title to 1,700 acres at Kraft Slough. This land base was established by acquiring 1,520 acres from willing sellers and 480 acres of Bureau of Land Management withdrawn lands. Reclamation activities at Kraft Slough include seeding of native grasses, control of noxious weeds, and management for wildlife.

South Dakota



Reclamation Storage Dams in South Dakota

★ Dakotas Area storage dam

The Bureau of Reclamation in South Dakota

The Dakotas Area Office is responsible for administering Reclamation programs in North and South Dakota. The mission of the office is to provide technical assistance and leadership in the responsible development and management of water and related resources to enhance the quality of life in both states.

The Area Office is located in Bismarck, North Dakota, and field offices are located in Pierre and Rapid City, South Dakota. The Area Office manages five dam and reservoir facilities in South Dakota including Angostura, Belle Fourche, Deerfield, Pactola and Shadehill. All are on tributaries of the Missouri River

Facilities in South Dakota provide water to over 73,000 acres of farmland on about 610 farms which produce about \$14 million of crops each year. Nearly a half million visitors use Reclamation reservoirs in the state each year for recreation.

There are nine Indian reservations in South Dakota, including the Standing Rock and Lake Traverse reservations which straddle the South Dakota-North Dakota border. The Area Office works closely with six of the reservation on water issues.

The Pick-Sloan Missouri Basin Program in South Dakota

Angostura Unit

The Angostura Unit of the Pick-Sloan Missouri Basin Program is located at the southeast edge of the Black Hills. Angostura Dam and Reservoir are on the Cheyenne River about 9 miles southeast of Hot Springs. Primary purpose of the project is to provide irrigation water for production of forage and grain crops on about 12,218 acres of farmland along the Cheyenne River for about 24 miles downstream from the dam. The dam is a concrete gravity structure with an earthen embankment. The dam is 193 feet high and 2,030 feet long. The concrete portion is 970 feet long and the earth embankment 1,060 feet long. The administration of the reservoir lands and recreation management programs are contracted to South Dakota Game, Fish, & Parks.



Pactola Dam and Reservoir

Rapid Valley Unit

Rapid Valley Unit of the Pick-Sloan Missouri Basin Program consists of Pactola Dam and Reservoir on Rapid Creek about 15 miles west of Rapid City. The dam is a zoned earthfill structure, 230 feet high, 40 feet wide at the crest, and 1,255 feet long. Deerfield Dam and Reservoir is located on Castle Creek, a tributary to Rapid Creek, about 25 miles west of Rapid City. Deerfield Dam, a zoned earth filled structure, has a structural height of 133 feet and a crest length of 825 feet. These reservoirs store water to serve 8,900 acres of farmland in the Rapid Valley Water Conservancy District and also serve as the major supply of municipal and industrial water for Rapid City, including Ellsworth Air Force Base, and flood protection along Rapid Creek.

Belle Fourche Project

The Belle Fourche Project, one of the earliest built by Reclamation, is located in western South Dakota northeast of the Black Hills. Principal structures include a diversion dam, storage dam, and a system of canals, laterals, and drains to irrigate about 57,000 acres in the general area of the towns of Newell, Vale and Nisland. While developed primarily for irrigation, the project provides flood control, fish and wildlife and recreation benefits to the area. The Belle Fourche Diversion Dam diverts water into the Inlet Canal which carries it to the Belle Fourche Reservoir for regulatory storage and delivery to the project lands. The reservoir is impounded behind Belle Fourche Dam (formerly Orman Dam) which is about 10 miles northeast of Belle Fourche. It is a 122-foot-high, 6,262-foot-long earthfill structure.

Keyhole Unit

While located in northeastern Wyoming, the Keyhole Unit of the Pick-Sloan Missouri Basin Program provides supplemental storage and a supply of irrigation water to the Belle Fourche Project. The unit is managed by the Dakotas Area Office.



Keyhole Dam and Reservoir

Shadehill Unit

Shadehill Unit of the Pick-Sloan Missouri Basin Program consists of Shadehill Dam and Reservoir on the Grand River in the northwestern part of the state. Associated diversion facilities divert directly from the reservoir or from the Grand River downstream from the dam. In addition, the reservoir provides benefits for flood control, fish and wildlife conservation, recreation, and silt detention. The dam is a rolled-fill earthen structure 145 feet high and with a crest length of 12,843 feet. The



Shadehill Dam

The administration of the reservoir lands and recreation management programs are contracted to South Dakota Game, Fish, & Parks. There are currently no contracts for water supply from the reservoir.

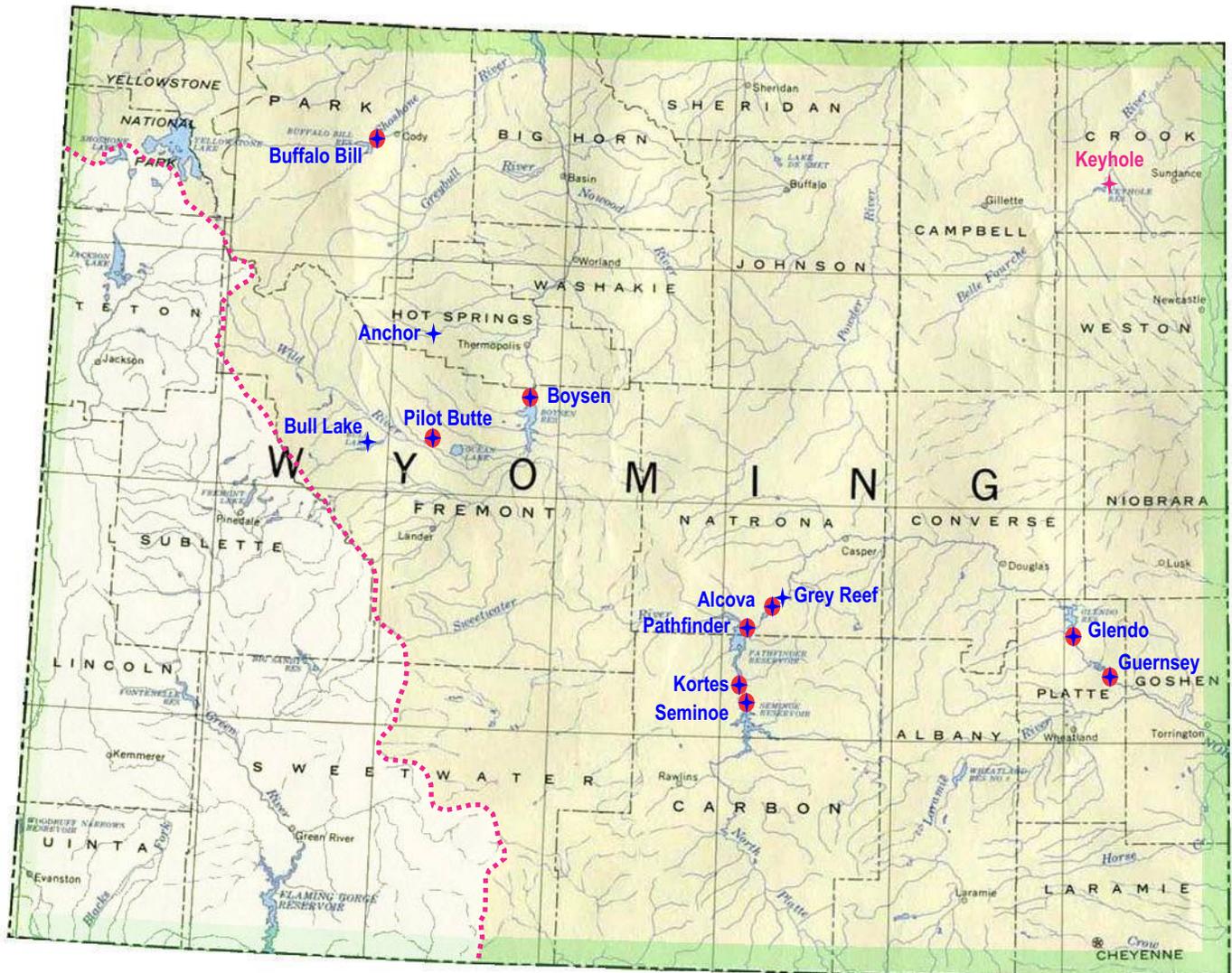
Oahe Unit

Oahe Unit of the Pick-Sloan Missouri Basin Program was authorized to provide for irrigation of 190,000 acres, fish and wildlife conservation and enhancement, recreation, municipal water supplies, flood control, and other project purposes. The principle features of the Oahe Unit included a system of main canals, including the Pierre Canal, running east from the Oahe Reservoir; and the establishment of regulating reservoirs, including the Blunt Dam and Reservoir, located approximately 35 miles east of Pierre, South Dakota. Construction was initiated in 1972 but halted on September 30, 1977, when Congress did not include funding in the FY 1978 appropriations in response to local opposition to the project. Since the termination of construction, Reclamation has conducted minimum maintenance of the constructed and partially constructed facilities, and have leased Pierre Canal and Blunt Reservoir lands, in many cases to the original land owners.

Rural Water Systems in South Dakota

The majority of the state of South Dakota is served by rural water systems funded by Reclamation. These projects include Mni Wiconi, Mid Dakota, Lewis and Clark, and Perkins County Rural Water Systems. The majority of the area served by these systems are receiving water but construction on some projects and additional areas to be served continues.

Wyoming



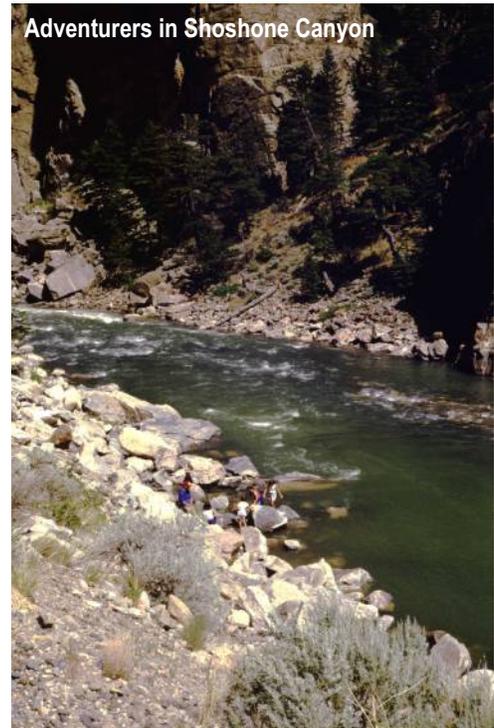
Reclamation Storage Dams in Wyoming

- ✦ Wyoming Area storage dam
- ⊕ Wyoming Area storage dam and hydropower generation
- ✦ Dam managed by Dakotas Area Office
- ⋯ Great Plains Region western boundary

The Bureau of Reclamation in Wyoming

Reclamation has been involved with the conservation and development of Wyoming's water resources for more than 90 years. The agency's Wyoming Area Office (WYAO) administers several multipurpose projects which provide an important economic base to the region by supplying water to 43 water user entities which collectively serve approximately 650,000 acres of land, and 8 municipal and industrial contractors which serve a rural and urban population of about 50,000. The projects also provide hydroelectric power, flood control, fish and wildlife enhancement, and recreation.

The Wyoming Area Office in Mills, manages the Boysen, Glendo, Buffalo Bill, Hanover-Bluff, Kortez, Owl Creek, and Riverton Units of the Pick-Sloan Missouri Basin Program; the Shoshone Project in the Bighorn River Basin; and the North Platte and Kendrick Projects in the North Platte River Basin. Features of the North Platte Project extend into Nebraska. WYAO facilities include 19 dams and 20 reservoirs with a collective storage capacity of more than 4.8 million acre-feet, and 12 powerplants with a combined installed capacity of almost 280 megawatts. The WYAO has a centralized control center located in Mills, Wyoming, that provides automated supervisory control of the federal dams and powerplants on the North Platte, Wind, Bighorn, and Shoshone Rivers in Wyoming; and for Yellowtail and Canyon Ferry Dams and powerplants in Montana.



The Pick-Sloan Missouri Basin Program in Wyoming

Many of the projects in Wyoming were constructed under the Pick-Sloan Missouri Basin Program. For a brief description of Pick-Sloan see page 4 of the *Who We Are* section.

Boysen Unit

The Boysen Unit on the Wind River about 20 miles south of Thermopolis, Wyoming, consists of Boysen Dam, Reservoir, and Powerplant. Boysen Dam impounds the waters of Wind River, providing storage for power generation, irrigation, flood control, sediment retention, fish and wildlife, and recreation development. Boysen Reservoir plays a major role in the irrigation of farmland in the Wind River Basin above the reservoir and in the Bighorn Basin below the reservoir. Boysen Dam is a 220-foot-high zoned earthfill structure. The powerplant has an installed capacity of 15,000 kilowatts.

Glendo Unit

The Glendo Unit is a multiple-purpose development consisting of Glendo Dam, Reservoir and Powerplant, Fremont Canyon Powerplant, and Gray Reef Dam and its re-regulating reservoir. Glendo Dam is also a zoned earthfill structure, 190 feet high and 2,096 feet long. Glendo Powerplant has an installed capacity of 24,000 kilowatts. Fremont Canyon Powerplant sits deep in the canyon below Pathfinder Dam and at the head of Alcova



Reservoir. It has a generating capacity of 66,800 kilowatts. The Glendo Unit facilities are adjacent to and work in conjunction with other units of the Pick-Sloan Missouri Basin Program as well as the Kendrick and North Platte Projects. The unit furnishes water from Glendo Reservoir for irrigation in Wyoming and Nebraska, and electrical power is supplied to Wyoming, Colorado, and Nebraska by the two powerplants. Public Law 85-965 provides a minimum flow of 330 cubic feet per second (cfs) below Gray Reef Dam for fish and wildlife enhancement and improvement of the quality of the municipal and industrial water supply in the North Platte River Valley between Gray Reef Dam and Glendo Reservoir.

Hanover Bluff Unit

The Hanover-Bluff Unit is in north-central Wyoming near Worland. Water is diverted by a diversion dam on the Bighorn River into a canal, lateral and pumping system which serves over 8,000 acres of farmland..

Kortes Unit

The Kortes Unit in central Wyoming about 60 miles southwest of Casper was the first unit initiated by the Bureau of Reclamation under what ultimately became the Pick-Sloan Missouri River Basin Program. It was designed solely for power production. The unit consists of Kortes Dam, Reservoir, and Powerplant. The dam is a 244-foot-high concrete gravity structure which sits in the 1,000-foot-deep gorge of the Black Canyon of the North Platte River. The powerplant is at the base of the dam. It has three generators with a total capacity of 40,000 kilowatts. Public Law 92-146 provides for a 500 cfs minimum flow below Kortes Dam in the stretch of the North Platte River known as the "Miracle Mile."

Owl Creek Unit

Anchor Dam is a thin-arch concrete structure located in a narrow gorge on the South Fork of Owl Creek, a tributary of the Bighorn River, west of Thermopolis, Wyoming. It was built to store water for irrigation use. During construction of the dam, several deep cavities were discovered in the foundation immediately upstream of the dam and an extensive system of sinkholes and faults was discovered along the floor of the reservoir area. This has prevented any permanent storage of water in the reservoir, but the reservoir does provide supplemental irrigation water to 11,251 acres of farmland.

Riverton Unit

This unit is located in central Wyoming in Fremont County on the ceded portion of the Wind River Reservation. Direct flow water from the Wind River and stored water from Bull Lake Creek are used to provide irrigation water to about 71,000 acres. Unit features are Bull Lake Dam, Pilot Butte Dam, Wind River Diversion Dam, and Pilot Butte Powerplant, together with about 100 miles of main canals and 300 miles of laterals. Bull Lake Dam is an 81-foot-high earthfill structure which impounds a reservoir with a 152,000 acre-foot storage capacity. Pilot Butte Dam is also earthfill, 51 feet high and over a mile wide. Pilot Butte Powerplant has a capacity of 1,600 kilowatts.

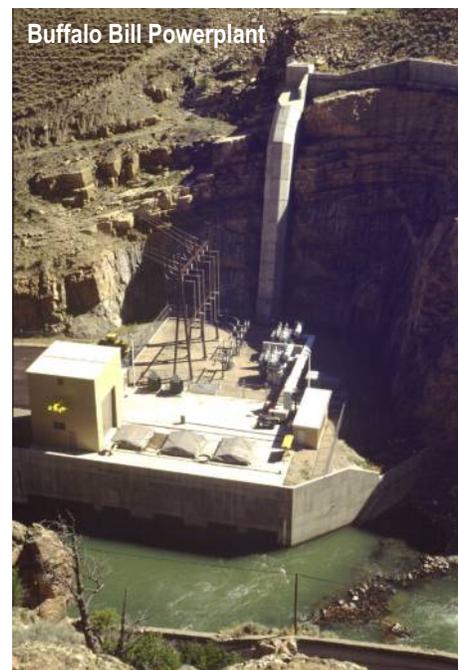
Keyhole Unit

The Keyhole Unit is located in northeastern Wyoming, but provides a supplemental supply of irrigation water to the Belle Fourche Project in South Dakota and is managed by Reclamation's Dakotas Area Office. The primary feature of the unit is Keyhole Dam across the Belle Fourche River, which forms a reservoir with a total capacity of 340,000 acre-feet. The dam is a zoned earth-filled structure with a maximum structural height of 168 feet and a crest length of 3,420 feet. Recreation facilities developed around the reservoir are managed by the Wyoming State Parks and Historical Sites.

Other Projects in Wyoming

The Shoshone Project

The Shoshone Project is near Cody in northwestern Wyoming. Features of the project include Buffalo Bill Dam and Reservoir, Shoshone and Heart Mountain Powerplants, associated transmission facilities, and a network of canals and laterals to deliver water to lands in four irrigation divisions. A full or supplemental irrigation water supply is available for about 93,000 acres. Buffalo Bill Dam, which was completed in 1910, was one of the first concrete dams built in the United States. It is a 325-foot-high concrete arch dam. When built, it was the tallest dam in the world. In 1993 an 8-year project to raise the crest of the dam was completed. The modification project was done under the



authority of the Pick-Sloan Missouri Basin Program. It created an additional 250,000 acre-feet of storage. At the same time an additional 25,500 kilowatts of generating capacity was added by building the new Buffalo Bill Powerplant, refurbishing the existing Shoshone Powerplant, and adding power generating capacity to the Spirit Mountain Energy Dissipation Structure which reduces the pressure of water being delivered to Heart Mountain Canal. Some of the water passing through the dissipation structure supplies the Shoshone Municipal Pipeline which serves six towns and several rural areas in park and Bighorn counties.

The North Platte Project

The North Platte Project extends 111 miles along the North Platte River Valley from Guernsey, Wyoming to Bridgeport, Nebraska. The project provides full service irrigation for about 226,000 acres divided into four irrigation districts. Supplemental irrigation service is furnished to nine water-user associations serving a combined area of about 109,000 acres. The project includes five storage dams; four diversion dams; one pumping plant; one powerplant; and about 2,000 miles of canals, laterals, and drains. Operation of this project is complicated by a U.S. Supreme Court decree, agreements, and laws governing water rights. The use and quantity of water are allocated for certain defined purposes, some on a priority basis, some on a proportionate share basis, and some on a geographical source basis.

Major project facilities are Pathfinder Dam and Guernsey Dam and Powerplant. Waters of the North Platte River pass the Seminoe and Kortes Dams



before entering the reservoir above Pathfinder Dam, which also impounds the flow from the Sweetwater River. Pathfinder Reservoir has a storage capacity of 1,016, 000 acre-feet and holds much of the North Platte Project water. During the non-irrigation season, water is released for winter hydropower generation and is restored downstream in Glendo reservoir. The dam is in a granite canyon on the North Platte River about 3 miles below its junction with the Sweetwater River and about 47 miles southwest of Casper. Started in 1905, it was one of the first built by the Bureau of Reclamation (then called the Reclamation Service). It is made of granite quarried from nearby hills and is faced with large rectangular blocks laid in horizontal courses. It is an arch dam with a gravity-type section, and has a structural height of 214 feet.

Guernsey Dam and Powerplant are upstream from Guernsey, Wyoming. The dam is a diaphragm-type embankment of sluiced clay, sand, and gravel that forms an impervious core. Its slopes are protected by a thick layer of rock riprap. It is 135 feet high. The powerplant is on the right bank below the dam and has two generators, each of which has an installed capacity of 3,200 kilowatts. Power is transmitted to towns and industries down the valley over transmission lines which are operated and maintained by the Western Area Power Administration.

Kendrick Project

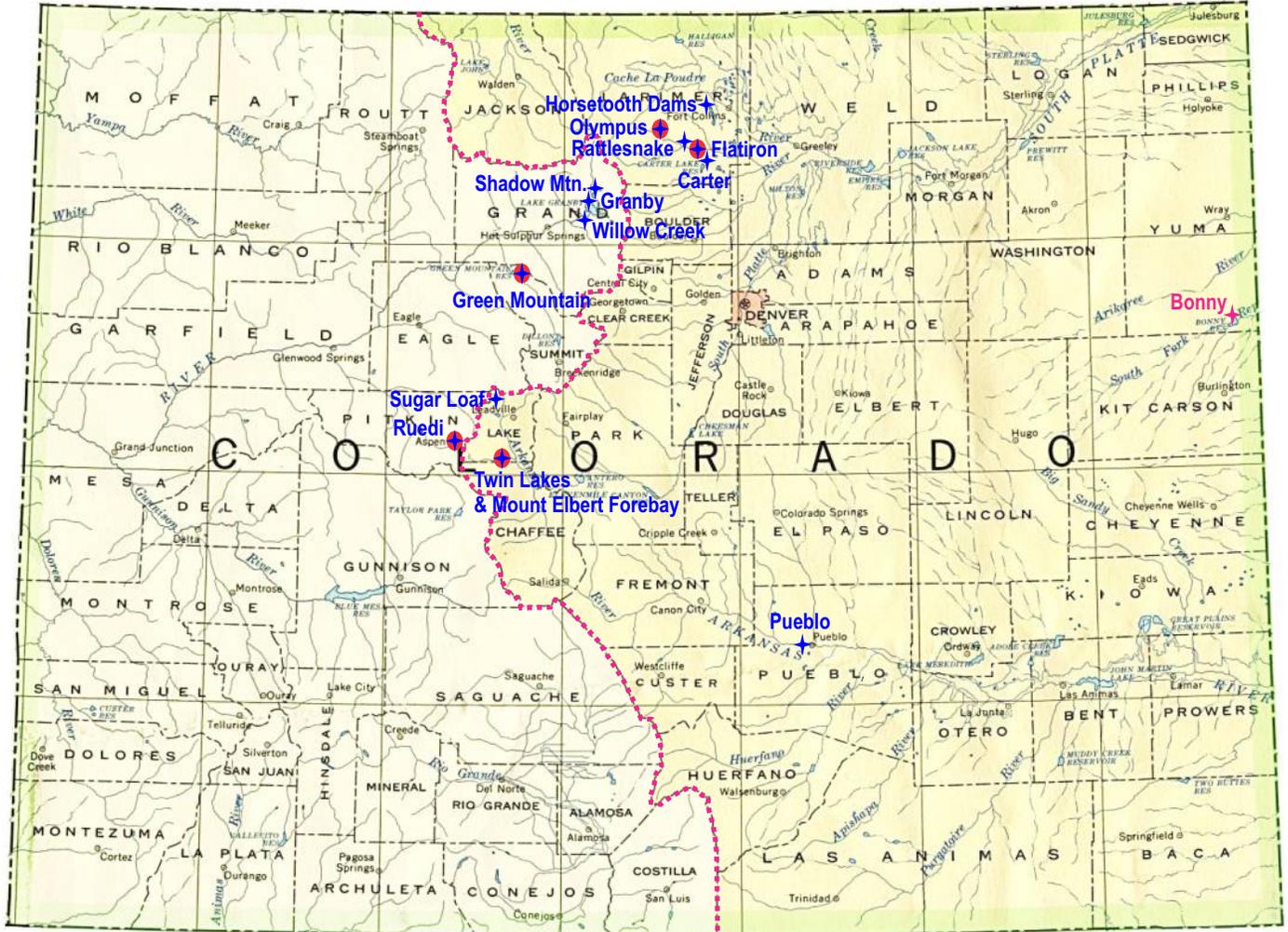
The Kendrick Project (formerly the Casper-Alcova Project) conserves the waters of the North Platte River for irrigation and electric power generation. Major features of the project are Seminoe Dam and Powerplant, Alcova Dam and Powerplant, a canal and laterals, and power distribution systems. Seminoe Dam is a 295-foot-high concrete arch. The powerplant contains three generators, each with a capacity of 15,000 kilowatts.

About 24,000 acres of irrigated lands lie in an irregular pattern on the northwest side of the North Platte River between Alcova and Casper. Some features of the North Platte Project and the Kortes Unit of the Pick-Sloan Missouri Basin Program are interspersed along the North Platte River with features of the Kendrick Project and they operate together in the control of the river's water.

Alcova is a 265-foot-high zoned earthfill structure which was completed in 1938. It was designed to function as a high diversion dam to divert water into the Casper Canal for irrigation in the Kendrick Project. The powerplant, which began operation in 1955, uses a 165-foot drop from the reservoir to power two 18,000 kilowatt generators.



Colorado



Reclamation Storage Dams in Eastern Colorado

- ✦ Eastern Colorado Area storage dam
- ⊕ Eastern Colorado Area storage dam and hydropower generation
- ★ Dam managed by the Nebraska-Kansas Area Office
- Great Plains Region western boundary

Note: Dams shown outside the Great Plains Region (on the west slope of the continental divide) are the responsibility of the Eastern Colorado Area Office and serve to collect water for projects on the east slope.

The Bureau of Reclamation in Colorado

The Great Plains Region's projects and operations in Colorado are generally in eastern Colorado and the east slope of the Rocky Mountains, but there are water diversion and storage facilities on the west slope as well. The Great Plains Region's facilities are managed by the Eastern Colorado Area Office (ECAO) in Loveland, Colorado.

Because 80% of Colorado's precipitation falls on the west slope of the Rockies, and 80% of Colorado's population lives on the east slope, the ECAO's two largest projects, the Colorado-Big Thompson Project and Fryingpan-Arkansas Project, divert and store water on the west slope for use on the arid east slope. ECAO also manages the Trinidad Project in the southeast corner of the state, handles resource issues at Bonny Dam and Reservoir in the northeast corner of the state (part of the Pick-Sloan Missouri Basin Program), land issues at the Narrows also in the northeast, and the Leadville Mine Drainage Tunnel and Treatment Plant near the town of Leadville.

In total, the region's projects in Colorado serve 3,611 farms with a total of about a million acres of irrigated lands. Those lands produce about \$368 million worth of crops each year and provide water to a rural and urban population of nearly one million people.

The Colorado-Big Thompson (C-BT) Project is one of the most complex projects undertaken by Reclamation and was built to serve northeastern Colorado. It includes over 100 water and power facilities which store and regulate water and divert it from the west slope of the Rockies (Upper Colorado River Basin) under the Continental Divide to 125 water user organizations and municipalities on the east slope (South Platte River Basin). Reclamation works closely with the Northern Colorado Water Conservancy District, its partner on the project. The west slope collection system and the distribution segments of the east slope facilities for the C-BT are operated and maintained by the Northern District.

The Fryingpan-Arkansas Project also diverts west slope water under the divide, and was built to serve southeastern Colorado. It diverts water from the Upper Colorado River Basin (the Fryingpan River) and delivers it to the Arkansas River Valley on the east slope. The project has five storage reservoirs and one pumped storage unit with power generating capacity. The terminal storage feature is Pueblo Dam near the city of Pueblo. The Southeastern Colorado Water Conservancy District is the sponsoring agency of the Fryingpan-Arkansas Project.



Reclamation staffer participating in annual cleanup of the Arkansas River.

The Trinidad Project is a Federal project constructed, operated, and maintained by the Army Corps of Engineers. Because the Trinidad Project includes irrigation and municipal functions, Reclamation administers the repayment contract with the Purgatoire River Water Conservancy District.

The Bonny Reservoir facilities are part of the Arnel Project and operated and maintained by the ECAO's sister office in Nebraska. However, because the land for the project is actually in Colorado, the ECAO is responsible for permit and land issues, recreational and wildlife improvements and management of Title 28 funds designated for use at Bonny.

The Narrows Unit was authorized for construction and operation in 1970. The project would have provided water for supplemental irrigation, municipal and industrial uses, recreation, and fish and wildlife conservation and enhancement. Reclamation suspended activities on the Narrows Unit in the late 1980s. A portion of the land acquired for the project is currently being leased for agricultural use, while the remainder is managed for wildlife management and enhancement.



Reclamation operates and maintains a water treatment plant at the Leadville Mine Drainage Tunnel under a National Pollutant Discharge Elimination System (NPDES) discharge permit. The tunnel, constructed between 1943 and 1952 by the Bureau of Mines, had historically discharged water containing heavy metals into the Arkansas River. Reclamation assumed ownership of the tunnel in 1959. Reclamation began operation of the treatment plant in 1992 and since that time all discharges to the river have met or exceeded standards..

Colorado-Big Thompson Project

The Colorado-Big Thompson (C-BT) Project spreads over a 250 mile corridor of the state. It provides irrigation water for about 800,000 acres of farmland, municipal and industrial use, hydroelectric power, environmental enhancement, and water-oriented recreation. The project diverts about 240,000 acre-feet of water annually. The Northern Colorado Water Conservancy District apportions the water used for irrigation to more than 120 ditches and 60 reservoirs. Eleven communities receive municipal and industrial water from the project. Electric power produced by six powerplants is marketed by the Western Area Power Administration.

The major facilities of the C-BT are as follows:



Green Mountain Dam is on the western slope 13 miles southeast of Kremmling on the Blue River, a tributary of the Colorado. The dam and reservoir provide storage for water which replaces that diverted to the east slope and for future west slope development. The dam is an earthfill structure, 309 feet high, with a crest length of 1,150 feet. A hydroelectric plant houses two 13 megawatt generators.



Willow Creek Dam is 127 feet high, 1,100 feet long, and constructed of earthfill. It includes 3.4 miles of canals and a pumping plant with two 200-cubic-foot-per-second pumps that lift water 175 feet into Lake Granby. The dam diverts an average of 40,000 acre-feet of water each year from Willow Creek into Lake Granby. The reservoir capacity is 10,600 acre-feet.



Granby Dam is on the Colorado River northeast of the town of Granby. It collects and stores most of the project water. The 298-foot-high dam is compacted earthfill with a crest length of 861 feet. There are also 12,722 feet of auxiliary dikes associated with the facility. The reservoir has a capacity of 539,800 acre-feet.



Water is pumped from Lake Granby into Shadow Mountain Lake by the Farr Pumping Plant (formerly Granby) and Canal. The pumping plant contains three centrifugal pumps with a total capacity of 600 cubic feet per second. The pumping lift ranges from 85 to 186 feet depending upon the water surface elevation in Lake Granby. The water is discharged into a canal which has a capacity of 1,100 cubic feet per second, and conveyed 1.8 miles to Shadow Mountain Lake.



Shadow Mountain Dam is on the Colorado River below its confluence with the Grand Lake outlet. It is an earthfill structure 63 feet high and 3,077 feet long. The

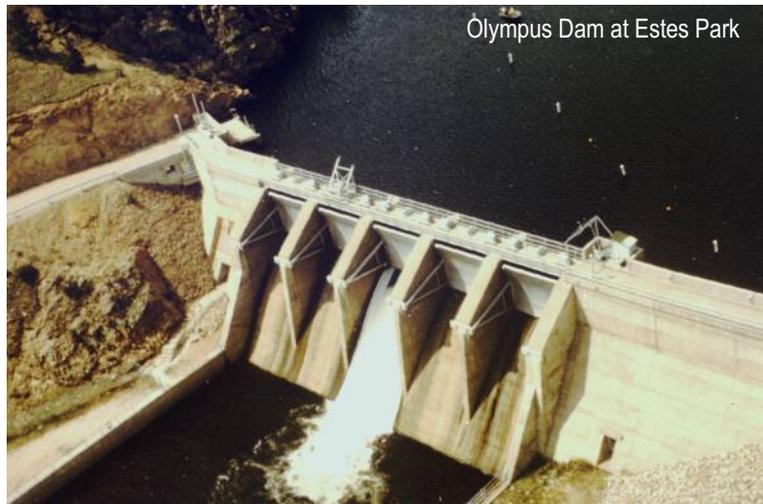
reservoir is linked to Grand Lake through a connecting channel. Shadow Mountain Lake receives the water pumped from Lake Granby and also intercepts North Fork flows of the Colorado River. Project water moves by gravity to Grand Lake, Colorado's deepest natural lake, and is released into the Alva B. Adams Tunnel, through which it flows to the eastern slope of the Continental Divide.



The 13.1-mile-long Alva B. Adams Tunnel extends from Grand Lake through the Continental Divide to a point 4.5 miles southwest of Estes Park. It is 9 feet in diameter. Water exits the tunnel and flows into the small East Portal Reservoir.



The structures of the upper-end East Slope Power System convey water 4.3 miles from East Portal to the Big Thompson River. From East Portal, water flows under Aspen Creek Valley in a siphon and then under Rams Horn Mountain in a tunnel.



Olympus Dam at Estes Park



At this point the water enters a steel penstock and falls 205 feet to Marys Lake Powerplant on the south shore of Marys Lake. The Mary's Lake power plant is a single-unit 8.1 megawatt facility.



From Marys Lake to Estes Powerplant, the water is dropped 482 feet in a pressure system consisting of Prospect Mountain Conduit and Prospect Mountain Tunnel. Estes Powerplant has three 61.5 megawatt generator units served by three 78-inch-diameter penstocks about three-quarters of a mile long. Water from the plant flows into Lake Estes. Olympus Dam impounds Lake Estes on the Big Thompson River and provides regulating capacity for down-project energy purposes. Olympus is a zoned earthfill structure with a concrete overflow spillway, is 70 feet high and has a crest length of 1,951 feet. From Olympus Dam, the water can go one of two ways; either released directly to the Big Thompson River, or diverted into the Olympus Tunnel.



The Olympus Tunnel conveys water from Lake Estes in a southeasterly direction to the

southern power arm of the C-BT and to the foothills storage and supply system. Project water flows through Olympus Siphon and Tunnel to the Pole Hill Tunnel and Canal, and into Pole Hill Penstock and Powerplant. Pole Hill is another single-unit power plant in the foothills approximately 10 miles west of Loveland. It has a generating capacity of 35 megawatts. Water exits the plant into the Pole Hill Afterbay.



Carter Lake (top center) and Pinewood Lake (bottom)



From Pole Hill, water flows through a tunnel into Pinewood Reservoir formed by Rattlesnake Dam. Bald Mountain Tunnel carries the water from Pinewood through the hillside into a surge tank. From the surge tank, water falls approximately 1000 feet in two penstocks to the Flatiron Powerplant which discharges into Flatiron Reservoir.



The Flatiron Powerplant has a generating capacity of 94.5 megawatts. It contains two main power units and a reversible 13,000-horsepower pump-turbine unit-which lifts water southward from Flatiron Reservoir to Carter Lake. The pumping unit at Flatiron Powerplant pumps from Flatiron Reservoir to Carter Lake through a 1.4-mile long connecting pressure tunnel.



Carter Lake is one of two terminal storage reservoirs on the C-BT's East Slope. Water is stored here for delivery south to the Little Thompson River, St. Vrain Creek, Boulder Creek and Boulder Reservoir, and eventually, the South Platte River. If necessary, pumped flows to Carter Lake can be reversed and run back down to the Flatiron power plant for delivery to the northern part of the distribution system. Carter Lake is formed in a natural basin in the foothills by a 214-foot-high earthen dam and two smaller dams across low saddles in the surrounding hills.



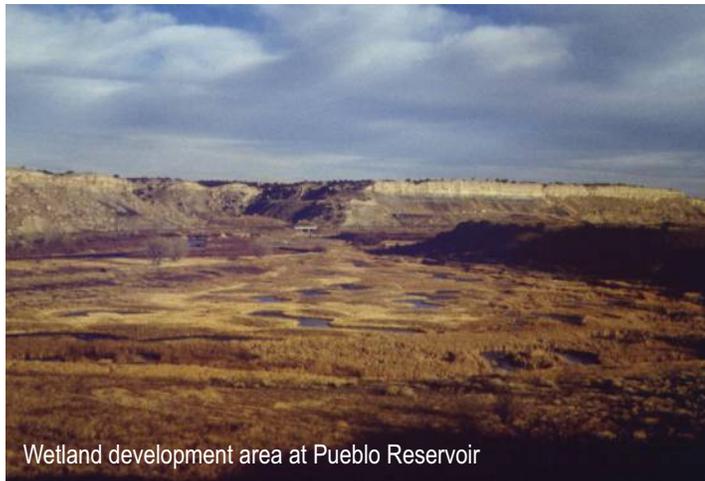
Flatiron Dam provides afterbay storage for water discharged from the powerplant. The water then flows by gravity, northward 13 miles through the Charles Hansen Feeder Canal to Horsetooth Reservoir for delivery to the Charles Hansen Supply Canal, the Poudre River, and, by exchange, to the North Poudre Supply Canal.



Big Thompson Powerplant is on the Big Thompson River about nine miles west of Loveland. The plant has a generating capacity of 4,500 kilowatts. Water from the Feeder Canal can be dropped through the plant for power generation and then released back into the Big Thompson River. The power plant operates seasonally and is a single-unit facility.



The Charles Hansen Feeder Canal conveys water to Horsetooth Reservoir which has a total storage capacity of about 151,750 acre-feet and provides the main supply for the Poudre Valley, where 50 percent of the project water is used. The reservoir is 6.5 miles long, and is formed by four large earthfill dams ranging in height from 155 to 240 feet and one dike. Major modifications to the Horsetooth dams were made between 2001 and 2003 under Reclamation's Safety of Dams Program.



Power transmission facilities include nearly 677 miles of transmission lines., 35 permanent substations, 2 mobile substations, 1 mobile transformer, 22 metering stations, and 6 permanent service shops. Transmission facilities are operated by the Department of Energy 's Western Area Power Administration.



The Fryingpan-Arkansas Project

The Fryingpan-Arkansas Project is a multi-purpose transmountain, trans-basin water diversion and delivery project. It makes possible an average annual diversion of 69,200 acre-feet of surplus water from the Fryingpan River and other tributaries of the Roaring Fork River on the western slope of the Rocky Mountains to the Arkansas River Basin on the eastern slope.

There are five dams and reservoirs in the project. Ruedi Dam and Reservoir on the Fryingpan River is the only storage facility on the western slope. There are four dams and reservoirs on the eastern slope. Sugar Loaf Dam and Turquoise Lake, Mt. Elbert Forebay Dam and Reservoir, and Twin Lakes Dam and Reservoir are in the upper Arkansas watershed. Pueblo Dam and Reservoir, the largest reservoir in the project, is on the Arkansas River.

The Western Slope

Ruedi Dam and Reservoir provide storage for about 100,000 acre-feet of water for irrigation, municipal benefits, recreation, and fish and wildlife enhancement on the western slope. The dam, about 15 miles east of the town of Basalt, is a rock and earthfill structure that stands about 285 feet high and has a crest length of 1,042 feet.

Seventeen diversion structures on the western slope are used to divert water into the Fryingpan-Arkansas collection system. The system includes nine tunnels with a combined length of 26.7 miles.

The collection systems on the western slope collect the melting snow and runoff from the high mountains and divert them underneath the Continental Divide through the 5.4-mile-long Charles H. Boustead Tunnel which is just west of Leadville.

The Eastern Slope

Turquoise Lake and Sugar Loaf Dam are located just east of the Continental Divide near Leadville. The dam is an earthfill structure about 135 feet high and 2,020 feet long. The lake provides storage for project water flowing from the Boustead Tunnel. Mt. Elbert Conduit conveys water from Turquoise Lake to the Mt. Elbert Forebay where it is used for generation of power in the Mt. Elbert Pumped-Storage Powerplant. The powerplant is on the north shore of picturesque Twin

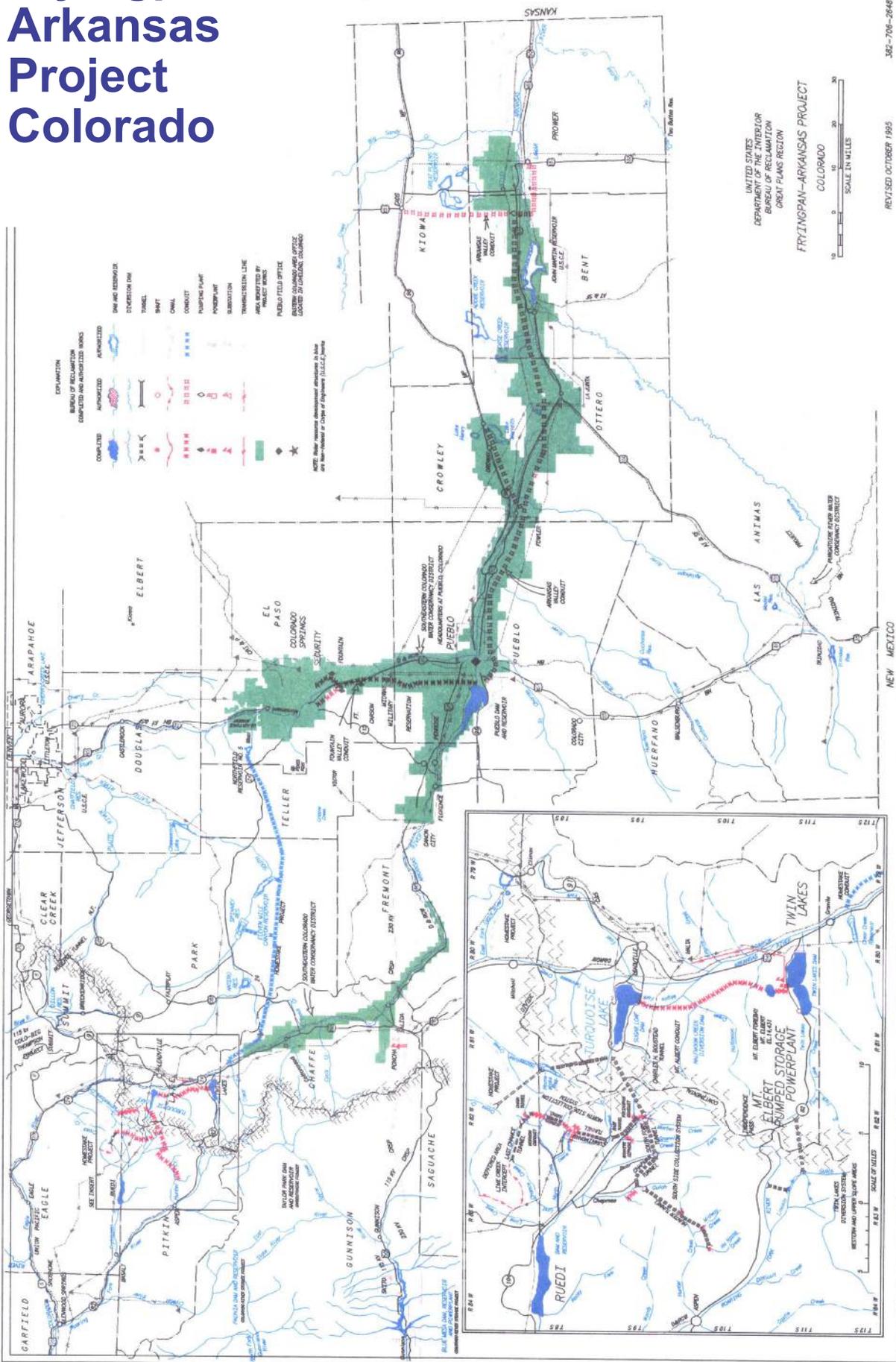


Lakes at the foot of 14,433-foot Mt. Elbert, Colorado's highest mountain. The powerplant is an all-concrete structure equivalent to a 14-story building, although most of the structure is below ground. The water drops 447 feet through penstocks, spinning two 138,000 horsepower hydroelectric turbine-generators and developing 200 megawatts of electrical power.

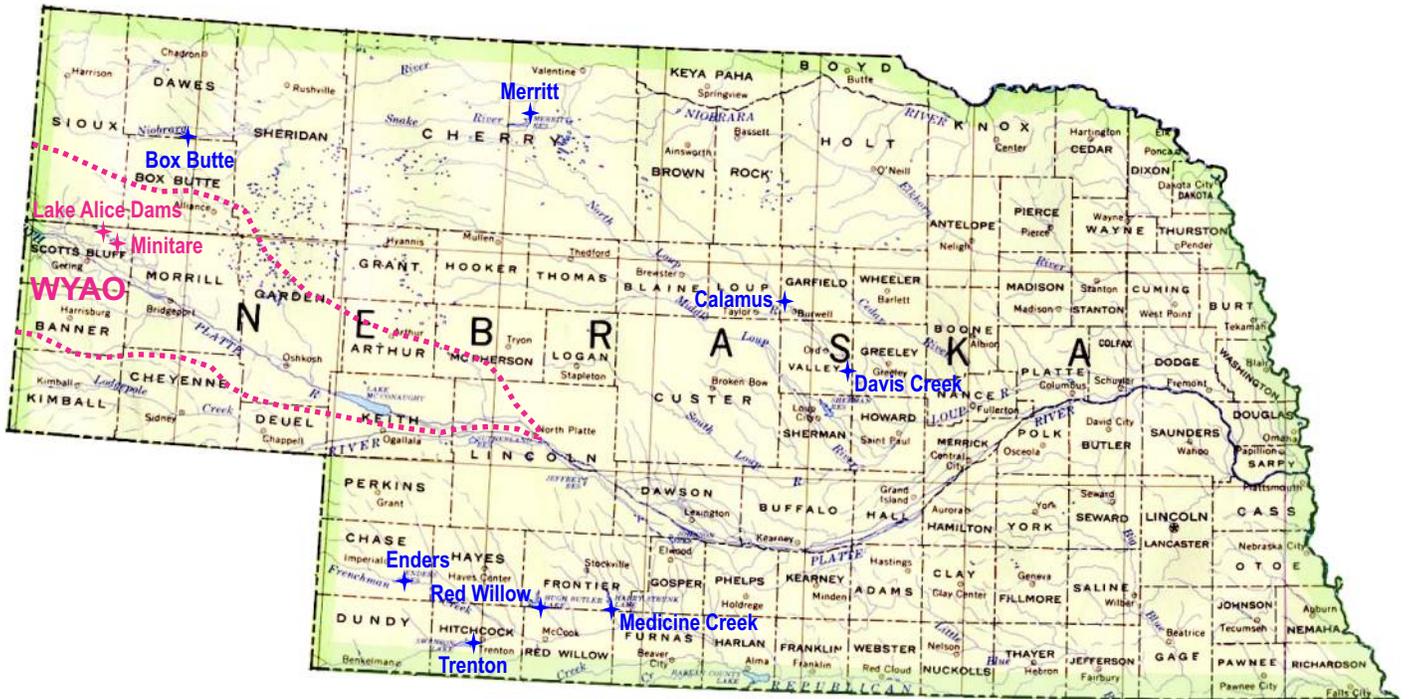
To allow for pumped storage and peaking power generation, the generators were designed to operate as a 170,000-horsepower electric motor that drives the turbines in reverse, pumping the same water back up to refill the forebay. This pumping mode normally will be used during the very early morning hours, when power demands are low and surplus low-rate power is received from other generating stations. This pump-back storage principle is advantageous because the generating units can be started quickly and adjustments of power output can be made rapidly to respond to varying patterns of daily and seasonal power demands. Water exits the powerplant into Twin Lakes. Twin Lakes Dam is a 53-foot-high zoned, rolled earthfill structure.

From Twin Lakes, project water is released to Lake Creek and the Arkansas River for delivery to project water users upstream of Pueblo Reservoir or for storage in Pueblo Reservoir. Project water is released from Pueblo Reservoir to the Arkansas River for irrigation and municipal purposes, to the Fountain Valley Conduit for municipal purposes, to the Bessemer Ditch for irrigation, and to the Pueblo Fish Hatchery for the fishery.

Fryingpan-Arkansas Project Colorado



Nebraska



Reclamation Storage Dams in Nebraska

- ✦ Nebraska-Kansas Area storage dam
- ✧ Dam managed by the Wyoming Area Office

The Bureau of Reclamation in Nebraska

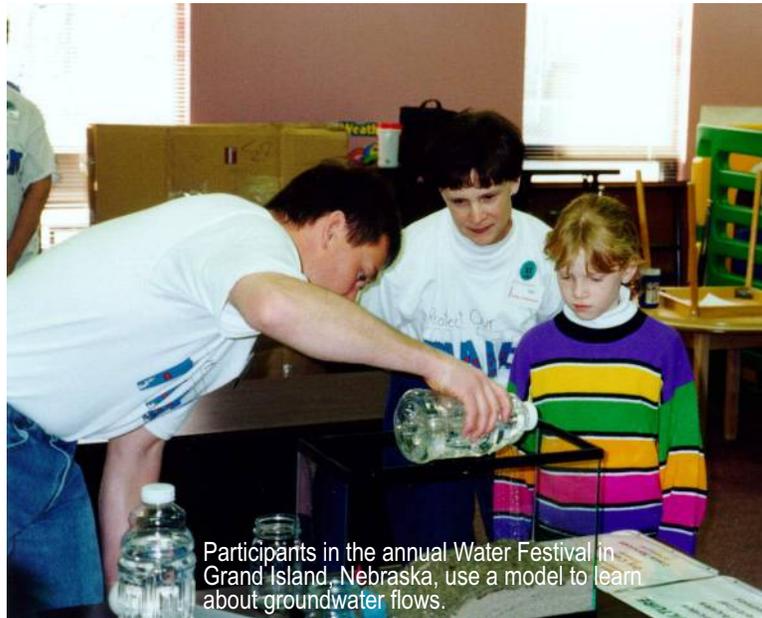
The Bureau of Reclamation has an active program in the state of Nebraska. Facilities in the state provide water to over 230,000 acres of farmland which provide about \$170 million worth of crops each year.

Reclamation's work in Nebraska began soon after the agency was created in 1902. Studies were started in 1903 and construction began in 1905 on the North Platte Project which includes facilities in both Nebraska and Wyoming. The North Platte Project is managed by the Wyoming Area Office in Mills, Wyoming.

Following construction of the North Platte Project, the Mirage Flats Project in the northwest corner of the state was built in the 1940's. Work followed on five divisions of the Pick-Sloan Missouri Basin Program which were built over a 40-year period. The first was the Frenchman-Cambridge Division in the southwestern part of the state which includes four storage dams along Frenchman Creek and the Republican River. Next came the Bostwick Division just downstream. Work on the Middle Loup Division in the north central part of the state commenced in 1955. One portion, the Sargent Unit in the state's midsection diverts water directly from the Middle Loup River and does not include storage facilities. Downstream of the Sargent Unit is the Farwell Unit of the Middle Loup Division which was built in the late 1950's and early 1960's. The Sandhills Division is near the confluence of the Snake and Niobrara rivers. The last Reclamation project built in Nebraska was the North Loup Division along the Loup and North Loup rivers. With the exception of the North Platte Project, the Reclamation projects in Nebraska are managed by the Nebraska-Kansas Area Office.

Mirage Flats Project

The Mirage Flats Project is in northwestern Nebraska on the Niobrara River. It includes Box Butte Dam and Reservoir, Dunlap Diversion Dam, Mirage Flats Canal, and distribution and drainage systems. Water is diverted from the Niobrara River to irrigate approximately 11,670 acres of fertile land on the north bank of the Niobrara River about 12 miles south of Hay Springs. Box Butte Dam is an earthfill structure which stands 60-feet high. The total capacity of the reservoir is 31,060 acre-feet.



Participants in the annual Water Festival in Grand Island, Nebraska, use a model to learn about groundwater flows.

The Pick-Sloan Missouri Basin Program in Nebraska

Frenchman-Cambridge Division

The Frenchman-Cambridge Division is in southwestern Nebraska. Storage facilities for the division consist of the Enders Reservoir and Swanson, Hugh Butler, and Harry Strunk lakes. Enders Dam is a 95.5-foot-high earthfill structure 1.5 miles south of the town of Enders. Trenton Dam is an earthfill structure which stands 100 feet high. Red Willow Dam is about 10 miles northwest of McCook. It is a 123-foot-high earthfill embankment that forms a reservoir of 85,070 acre-feet. The reservoir behind this dam is Hugh Butler Lake. Medicine Creek Dam is seven miles north of Cambridge. It is an earthfill embankment dam that is 115 feet high. Harry Strunk Lake is formed by the dam. The four dams, reservoirs, and irrigation systems provide storage to irrigate 66,160 acres of project lands and to provide flood control, fish and wildlife conservation, and recreation along the Republican River and its three tributaries.

Bostwick Division

The Bostwick Division is in south-central Nebraska and north-central Kansas. It extends from Orleans, Nebraska, above Harlan County Lake, to Concordia, Kansas, and includes land on both sides of the Republican River. Features of the Bostwick Division include Harlan County Dam and Lake on the Republican River (constructed by the Corps of Engineers), Lovewell Dam and Reservoir on White Rock Creek and other associated storage and distribution facilities. The reservoir, lake, and surrounding lands of the division provide benefits for flood control, irrigation, sediment control, fish and wildlife enhancement, and recreation. The Bostwick in Nebraska area consists of 22,935 acres of farmland.



Surge valves are loaned to irrigators in cooperation with the University of Nebraska Panhandle Research and Extension Center.

Middle Loup Division

Title to the facilities of the Middle Loup Division were transferred to the Middle Loup Reclamation District on November 22, 2002. The facilities are no longer publicly owned. As constructed by the Bureau of Reclamation in the mid-1950's, the Sargent Unit of the Middle Loup Division extended along the Middle Loup River Valley between the towns of Milburn and Comstock. Project facilities included the Milburn Diversion Dam on the Middle Loup River, the 40-mile-long Sargent Canal, and a number of associated facilities. The facilities provide irrigation water to about 13,922 acres of farmland.

The Farwell Unit of the Middle Loup Division includes Sherman Dam and Reservoir, Arcadia Diversion Dam, and associated facilities. Sherman Dam is an earthfill structure which is 98 feet high and 4,450 feet in length . At maximum surface elevation, the reservoir holds 69,076 acre feet of water and has a surface area of 2,868 acres. Arcadia Diversion Dam is a concrete structure with earthen embankments wings.

Sandhills Division

The Ainsworth Unit of the Sandhills Division is in north-central Nebraska. The storage facilities are on the Snake River. The unit provides supplies water to irrigate 34,539 acres of cropland in the Ainsworth Irrigation District. Project facilities include Merritt Dam and Reservoir and associated canals, laterals and drains. Merritt Dam is 121 feet high and has a crest length of 3,222 feet. It is a zoned earthfill embankment structure with soil cement on the upstream face. It was the first Bureau of Reclamation earthfill dam to use soil cement instead of the traditional rock riprap to protect the upstream face.

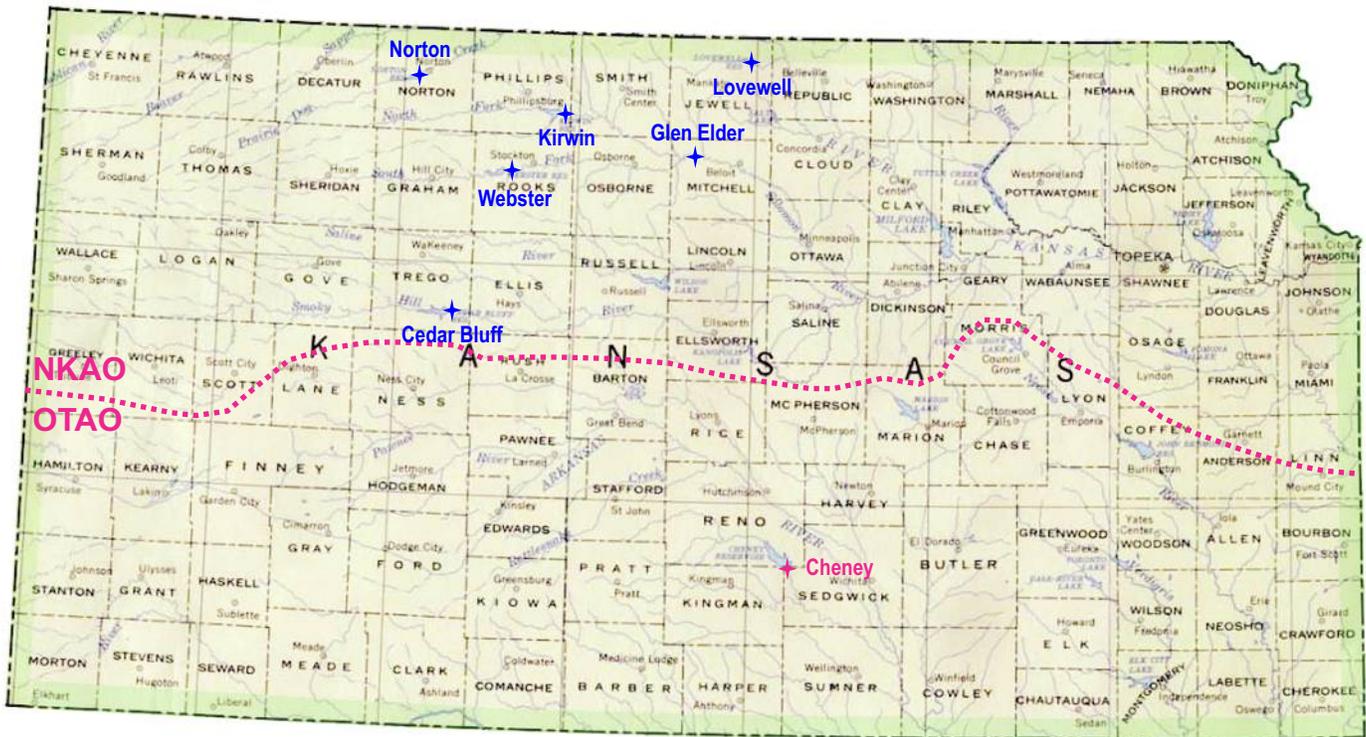
North Loup Division

Principal features of the North Loup Division include Calamus Dam and Reservoir, Kent Diversion Dam, Davis Creek Dam and Reservoir, and associated canals, pumping plants and laterals. Calamus Dam is a zoned, rolled earthfill structure on the Calamus River. The dam is 89 feet high and 7,295 feet long at its crest. Davis Creek Dam is also a zoned, rolled earthfill structure which is 109 feet high and 3,000 feet long.



Waterfowl take flight from Platte River wetlands during fall migration on the Central Flyway

Kansas



Reclamation Storage Dams in Kansas

- ★ Nebraska-Kansas Area storage dam
- ★ Oklahoma-Texas Area storage dam

The Bureau of Reclamation in Kansas

Located in the country's heartland, Kansas was settled during the late 1880's primarily by farmers. Today, about 95 percent of the state is devoted to agricultural production. Dryland farming was marginally successful, but farmers were soon digging wells and banding together to sink deep wells for irrigation. The Bureau of Reclamation's first involvement in Kansas came in the mid-1940's as projects were started to provide storage for irrigation and to protect the land from devastating floods.

Most of the development in Kansas has been done under the authority of the Pick-Sloan Missouri Basin Program (Pick-Sloan). The projects in Kansas are in the Republican, Solomon and Smoky Hill River basins. All of these rivers drain into the Kansas River, a tributary of the Missouri. All but one of the Reclamation projects in Kansas are managed by Nebraska-Kansas Area Office in Grand Island, Nebraska.



The Cedar Bluff Unit south and west of Hays was the first project built. It was followed by the Kirwin Unit on the North Fork of the Solomon River, the Webster Unit on the South Fork, the Kansas Bostwick Unit in the north central part of the state, the Almena Unit near the town of Norton and the Glen Elder Unit on the Solomon River at the point where the north and south forks join. All of these projects were built for irrigation and flood control purposes and all provide recreation and fish and wildlife benefits as well.

A seventh project in Kansas was not developed under Pick-Sloan. The Wichita Project is a multiple-purpose water project operated and maintained by the city of Wichita and the Kansas Department of Wildlife and Parks. Oversight for the project, which provides water for 320,000 people, is provided by Reclamation's Oklahoma-Texas Area Office.

The Pick-Sloan Missouri Basin Program in Kansas

The Pick-Sloan projects in Kansas (Almena, Cedar Bluff, Glen Elder, Kirwin, Webster and Kansas-Bostwick) provide water for about 74,200 acres of farmland which produce about \$15 million worth of crops each year. A large share of each reservoir is devoted to storage for flood control. All the Kansas projects are popular recreation areas. Over two million visitors use Reclamation reservoirs in the state of Kansas each year.

Almena Unit

The Almena Unit is located in the north central part of the state. It consists of Norton Dam and Keith Sebelius Lake (formerly Norton Reservoir), Almena Diversion Dam, and a system of canals, laterals and drains that serve 5764 acres of farmland in the project. In addition to storing water for irrigation, the unit provides water for the City of Norton; protects the valley downstream from floods; and offers opportunities for recreation and for conservation and development of fish and wildlife resources.

Storage for the Almena Unit is provided by Norton Dam and Keith Sebelius Lake. The dam is 101 feet high and is located near the town of Norton, Kansas. It is a zoned earthfill structure with rock riprap on its upstream face and has a crest length of 6,450 feet. Almena Diversion Dam has a 19 foot high reinforced concrete structure and earthen dikes which are 310 feet long and rise 31 feet high above the streambed.

Cedar Bluff Unit

The Cedar Bluff Unit is 18 miles southwest of Ellis, Kansas. Cedar Bluff Dam is 134 feet high with a 12,560 foot crest. The Cedar Bluff Unit was authorized for construction in 1944 for flood control, irrigation, fish and wildlife benefits and recreation. It was completed in 1951. Due to irreversible depletions of the water supply, the Cedar Bluff Unit was reformulated by Congress in 1992 (Title IX of P.L. 102-575 on October 30, 1992). The reformulation created an operating pool for fish, wildlife, recreation, and for groundwater recharge for environmental, domestic, municipal and industrial purposes. A joint-use pool was also authorized for flood control, water sales, fish, wildlife, and recreation. Under the reformulation legislation the contracts between the United States and the Cedar Bluff Irrigation District were terminated. The irrigation district water supply and distribution facilities were closed and abandoned and the District was dissolved under Kansas state law.



Kirwin Unit

The Kirwin Unit is located along the North Fork of the Solomon River. The project features a multiple-purpose dam and reservoir as well as a canal, lateral, and drainage system which serves 11,435 acres of farmland. The unit also provides flood protection, fish and wildlife benefits and recreation opportunities. The dam is a rolled earthfill structure 117 feet high and 12,646 feet long.

Webster Unit

The Webster Unit is between the towns of Woodston and Osborne, Kansas. Webster Dam, an earthfill embankment structure, is the principal feature which stands 105 feet high and is 10,720 feet in length. The unit provides flood control for areas downstream of the dam and irrigation water to 8,500 acres of cropland in Webster Irrigation District No. 4. The unit also includes a diversion dam, four pumping plants, and a system of canals, laterals, and drains.

Bostwick Division

The Bostwick Division is in south-central Nebraska and north-central Kansas. It extends from Orleans, Nebraska, above Harlan County Lake, to Concordia, Kansas, and includes land on both sides of the Republican River. Features of the Bostwick Division include Harlan County Dam and Lake on the Republican River (constructed by the Corps of Engineers), Lovewell Dam and Reservoir on White Rock Creek and other associated storage and distribution facilities. The Lovewell Reservoir and surrounding lands of the division provide benefits for flood control, irrigation, sediment control, fish and wildlife enhancement, and recreation. The Kansas-Bostwick area consists of 42,500 acres of farmland. Lovewell Dam is three miles northwest of the town of Lovewell, Kansas. The dam is an earthfill structure, 81 feet high and 8,500 feet long.

Glen Elder Unit

Glen Elder Unit is in the Solomon River Valley in north-central Kansas. The unit consists of Glen Elder Dam and reservoir, Waconda Lake, and protective dikes. The dam is an earthfill structure, 115 feet high and 15,275 feet long. The dam is one of the key flood control features in the Kansas River Basin. Water stored behind the dam provides irrigation for 6,000 acres of farmland in the Glen Elder Irrigation District as well as municipal and industrial water for the City of Beloit and the Mitchell County Rural Water District.

Other Projects in Kansas

Wichita Project

The Cheney Division of the Wichita Project consists of the Cheney Dam and Reservoir on the North Fork of the Ninnescah River. Cheney provides a supplemental water supply to the city of Wichita, flood control for protection of downstream areas, recreation, and fish and wildlife benefits. Cheney State Park and Cheney Wildlife Area provide public recreation opportunities at the reservoir. Both areas are managed by the Kansas Department of Wildlife and Parks

Cheney Dam is an earthfill structure which is 86 feet high and nearly five miles long. The maximum section of the upstream slope of the dam is protected by soil cement and the downstream slope is protected by a 12-foot horizontal layer of topsoil and grass. The city of Wichita constructed and operates a 93-cubic-foot-per-second pumping plant at the dam which provides municipal water to the water treatment plant in the city. Cheney Reservoir hosts approximately half of the recreation use that occurs at Reclamation reservoirs in the state of Kansas. In recent years, visitation at Cheney State Park has ranked first or second among all Kansas State Parks.

Oklahoma



Reclamation Storage Dams in Oklahoma

★ Oklahoma-Texas Area storage dam

The Bureau of Reclamation in Oklahoma

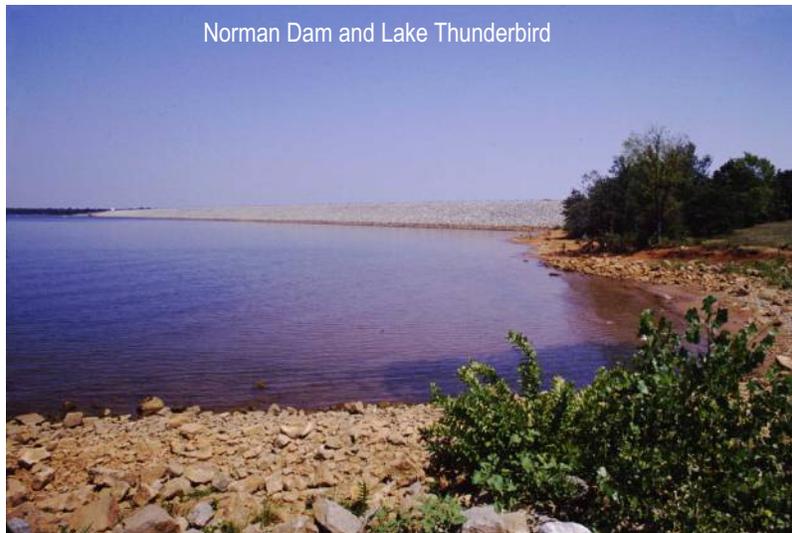
Reclamation projects in Oklahoma emphasize municipal and industrial (M&I) water but also provide multiple benefits including flood control and recreation. There are six projects with seven major reservoirs in the state, five of them constructed primarily to provide water to cities and towns. They are the Norman, Washita Basin (Foss and Ft. Cobb Reservoirs), Arbuckle, Mountain Park and McGee Creek projects. They provide M&I water to 18 cities and rural areas. In addition to providing M&I water, the W. C. Austin Project provides irrigation water to more than 40,000 acres of farmland in southwestern Oklahoma.

The Oklahoma Tourism and Recreation Department operates state parks at six of the reservoirs. The seventh reservoir, Lake of the Arbuckles, is located within the Chickasaw National Recreation Area under management of the National Park Service. There are also several state wildlife areas and the Washita National Wildlife Refuge at Foss Reservoir. In recent years, annual visitation at Reclamation projects in Oklahoma has exceeded 5 million.

Reclamation's activities in the state are managed by the Oklahoma-Texas Area which has offices in Austin, Texas, and Oklahoma City, Oklahoma. All of the projects' municipal and industrial (M&I), irrigation, recreation, and fish & wildlife facilities have been transferred to non-Federal or other Federal entities for operation and maintenance.

The Norman Project

The Norman Project provides a supplemental municipal water supply for the cities of Norman, Del City, and Midwest City. It also provides flood protection to lands south and east of the project area as well as significant recreation benefits. Principal structures are Norman Dam about 13 miles east of Norman, two pumping plants, and pressure pipelines to serve the three cities. The dam itself is a 144-foot high zoned earthfill embankment. The crest of the dam is 30 feet wide and 7,260 feet long. The reservoir has a storage capacity of 119,565 acre-feet and a surface area of 6,070 at conservation pool elevation.



Water stored behind the dam forms Lake Thunderbird. About 1.5 million people visit Lake Thunderbird State Park each year, making it one of the most popular recreation sites among all projects in the Great Plains Region.

Washita Basin Project

The Washita Basin Project has two divisions: Fort Cobb and Foss. The primary features of the Washita Basin Project are Foss Dam and Reservoir and Fort Cobb Dam and Reservoir, and appurtenant works. The project provides a municipal and industrial water supply for several cities and towns in southwestern Oklahoma as well as state parks and wildlife refuges in the area. The project also provides flood control, recreation, and fish and wildlife benefits.

Foss Dam is located on the Washita River about 15 miles west of Clinton. It is a 142-foot-high zoned earthfill structure with a 30-foot-wide crest which is 18,120 feet long. The reservoir has a surface area of 6,801 acres and a storage capacity of 177,923 acre-feet at conservation pool elevation. The reservoir provides M&I water for the cities of Clinton, Cordell, Hobart, and Bessie. Water is treated at the reservoir and transported from the reservoir to the cities through 50.8 miles of buried pipeline. On average more than 400,000 people per year visit Foss State Park and the Washita National Wildlife Refuge.

Fort Cobb Dam is on Cobb Creek about 5 miles north of Fort Cobb. This dam is also a zoned earthfill structure. It is 122 feet high with a crest width of 30 feet and length of 9,900 feet. Its total storage capacity is 73,883 acre-feet and its surface is 3,806 acres at the top of conservation pool. The reservoir provides M&I water to the cities of Anadarko and Chickasha and the Western Farmers Electric Cooperative near Anadarko. Water is conveyed from the reservoir through a 21-mile-long underground gravity-flow aqueduct system. Annual visitation at Fort Cobb State Park and the Fort Cobb Wildlife Management Area varies from 1 million to 1.5 million.



Fort Cobb Dam is a background to these golfers

Arbuckle Project

The Arbuckle Project furnishes M&I water to the communities of Davis, Ardmore, Dougherty, and Wynnewood, Oklahoma, and to a major oil refinery. Water from the reservoir is delivered through an aqueduct system. The project also provides flood control, fish and wildlife, and recreation benefits. Arbuckle Dam is an earthfill structure 150 feet high and 1,900 feet long. It impounds Lake of the Arbuckles, a reservoir with a surface area of 2,349 acres at conservation pool and a storage capacity of 72,399 acre-feet. The National Park Service administers the Chickasaw National Recreation Area which includes Lake of the Arbuckles. In recent years, annual visitation at the lake has averaged about 1.5 million visits.

Mountain Park Project

The primary purpose of the Mountain Park Project is to provide M&I water to the cities of Altus, Snyder, Frederick, and “environmental quality” water to the state’s Hackberry Flat Wildlife Management Area. The project also provides flood control, recreation, and fish and wildlife benefits. Mountain Park Dam is a thin double-curvature concrete arch flanked by concrete thrust blocks. It is 133 feet high and 535 feet long. The reservoir has a storage capacity of 97,250 acre-feet and covers about 6,400 acres at conservation pool elevation. Water is conveyed from the reservoir to the project cities through an underground aqueduct system that consists of 38 miles of pipeline and two pumping plants. About 150,000 people visit the Great Plains State Park and the Mt Park Wildlife Management Area each year.



McGee Creek Project

The McGee Creek Project is a multipurpose water resource development which was constructed to provide M&I water to Oklahoma City, Atoka County, the City of Atoka, and the Southern Oklahoma Development Trust (SODT). McGee Creek Dam is a 161-foot-high zoned earthfill structure which is 1,969 feet long. The reservoir has a storage capacity of 113,925 acre-feet and a surface area of 3,797 acres at conservation pool elevation. An 18-mile-long concrete pipeline connects a pumping plant at the dam with the Oklahoma City pumping plant at Lake Atoka. The project has two fairly unique “environmental quality” features: the 8,900-acre Natural Scenic Recreation Area and the 10,000-acre Wildlife Management Area. In addition, the project includes McGee Creek State Park. Annual visitation to these three public use areas has averaged about 200,000 in recent years.

W.C. Austin Project

The W. C. Austin Project is in southwestern Oklahoma. The project is designed to provide water for irrigation to about 48,000 acres of farmland. It also provides flood control on the North Fork of the Red River, water for the city of Altus, fish and wildlife conservation benefits, and recreation facilities. The primary storage unit is Lake Altus (locally referred to as Lugert), a reservoir formed by Altus Dam and several earthen dikes. The dam is a partially-curved concrete gravity structure with a granite masonry face. It stands 110 feet above foundation and is 1,112 feet long. Lake Altus has a storage capacity of 134,495 acre-feet and a surface area of 6,260 acres at Conservation Pool elevation. Quartz Mountain State Park and the Lugert-Altus Wildlife Management Area receive an average of over 500,000 visitors each year. The park has several outstanding facilities including a recently reconstructed lodge and convention center, a performing arts center, and an 18-hole golf course. The park is also the home of the summer and fall Oklahoma Arts Institutes.

Texas



Reclamation Storage Dams in Texas

- + Oklahoma-Texas Area storage dam
- ⋯ Great Plains Region western boundary

The Bureau of Reclamation in Texas

The Great Plains Region is responsible for Reclamation activities in all of Texas except west of the Pecos River. Much of the program emphasis is on municipal and industrial (M&I) water, although there is irrigation water provided at the San Angelo Project. Reclamation's projects provide municipal and industrial water to more than one million people in the state, provide flood protection, and are popular recreation sites with over two million annual visitors annually.

San Angelo Project

The San Angelo Project is in the immediate vicinity of the city of San Angelo in west-central Texas. Bureau of Reclamation development provided for the construction of Twin Buttes Dam and Reservoir, a headworks at Nasworthy Reservoir, and a delivery system to serve a 30,000-acre irrigation district.



Twin Buttes Dam and Reservoir is immediately upstream from the existing Nasworthy Reservoir, about 6 miles southwest of San Angelo. The dam is a 134-foot-high zoned earthfill structure with a crest width of 30 feet and a crest length of over 8 miles. Twin Buttes Reservoir has a storage capacity of 186,203 acre-feet and a surface area of 9,079 at conservation pool elevation. Recreation use has been limited in recent years due to low reservoir levels.

Irrigation water is released from Twin Buttes Reservoir into Nasworthy Reservoir, where it is diverted by project headworks into the 16-mile-long Main Canal. The project provides for the integrated operation of Twin Buttes Reservoir with the existing Nasworthy Reservoir to provide M&I water to San Angelo. In addition, the project provides flood protection, recreation, and fish and wildlife benefits.

Nueces River Project

The Nueces River Project is located in the coastal plain of South Texas midway between the cities of San Antonio and Corpus Christi. Choke Canyon Dam is on the Frio River about 4 miles west of the town of Three Rivers. Low-lying hills force the Frio, Nueces and Atascosa rivers into a constricted channel, thus the name "Choke Canyon." The primary purpose of the project is to provide M&I water to the city of Corpus Christi and the surrounding area. The project also provides recreation and fish and wildlife benefits.

Choke Canyon Dam is a rolled earthfill structure about 115 feet high and 3 miles long. The reservoir has a storage capacity of 691,130 acre-feet and a surface area of 25,733 acres at Conservation Pool elevation. The project includes Choke Canyon State Park with the Calliham and South Shore Units and the Daughtrey Wildlife Management Area. Annual visitation to these three areas has averaged around 400,000 in recent years.

Canadian River Project

The Canadian River Project is located in the panhandle of Texas near Fritch, Texas. The primary purpose of the project is to provide M&I water to eleven cities in the panhandle. The project features include Sanford Dam and Lake Meredith, 322 miles of underground pipelines, ten pumping plants, and three regulating reservoirs. The reservoir has a storage capacity of 815,318 acre-feet and a surface area of 16,514 acres at Conservation Pool elevation. In 1990, Congress established the Lake Meredith National Recreation Area (NRA) which includes all of Lake Meredith. The NRA is managed by the National Park Service and has received between 1.5 million and 2.0 million visitors annually in recent years. In 1999 title to the pipeline, pumping plants and regulating reservoirs was transferred to the Canadian River Municipal Water Authority. Sanford Dam and Lake Meredith remain in federal ownership but are operated and maintained by the Authority.