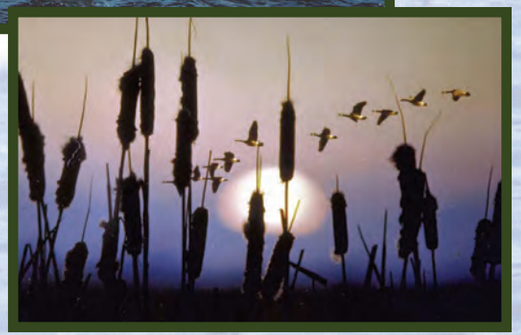
Appendix E

Informational Brochures for the Similar Projects



Several Agencies, Many Benefits

Reclamation, the U.S. Army Corps of Engineers, Boise Project Board of Control, and the Payette Division irrigation districts coordinate reservoir releases for irrigation, power generation, flood protection, municipal and industrial water use, recreation, water quality, and a healthy fishery.

What's the Yearly Value?

Irrigated crops: $581 million
Livestock industry: $600 million
Power generated: $13 million
Flood damage prevented: $170.5 million
Recreation: 830,000 visits - $30.7 million

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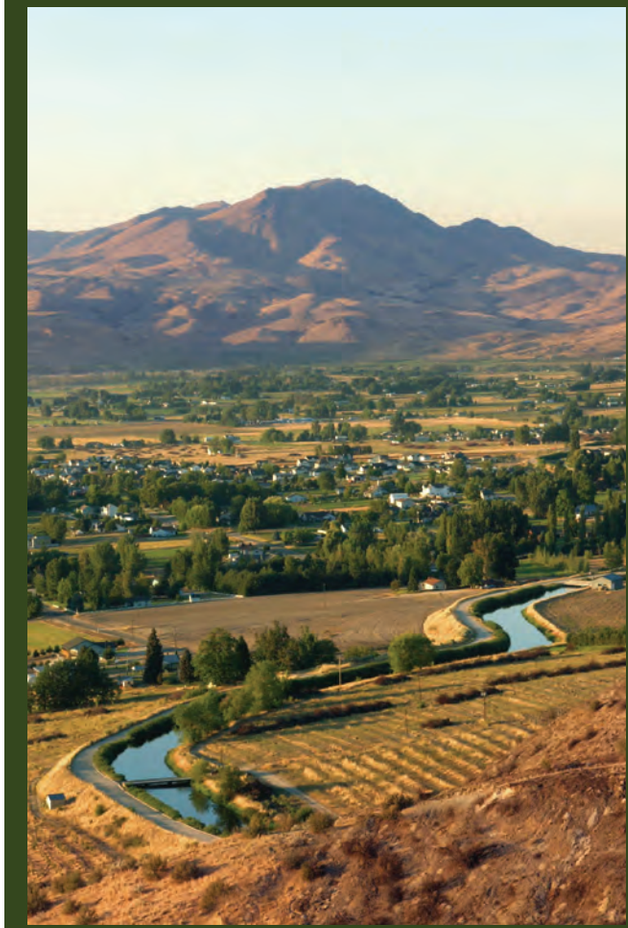
RECLAMATION

Managing Water in the West

The Story of the

Boise Project

IDAHO-OREGON



U.S. Department of the Interior
Bureau of Reclamation

The Pioneers

The discovery of gold in the early 1860s brought both miners and enterprising farmers to Idaho. The climate and soils of the Boise and Payette River valleys were ideal for farming. Early farmers quickly developed fertile lands along the rivers, but could not get water to the desert without irrigation systems.

Landscape before irrigation

Local developers worked in the 1880s toward a diversion dam and huge canal system to irrigate lands south of the Boise River. They built a few miles of the canal before financing from New York investors ran out, and the task was abandoned. Similar stories repeated throughout the West.

How It All Started

Congress passed the Reclamation Act in 1902 to boost development of the arid West. Those who receive irrigation water and power from Reclamation projects pay part of the construction costs and ongoing operation and maintenance costs.

Reclamation acquired property rights in 1906 that made it possible for the agency to manage and enlarge previously private canals near Boise. Reclamation began its task of creating water storage and irrigation networks by building some of its earliest structures on the Arrowrock Division of the Boise Project. The New York Canal was extended 40 miles to carry water from Boise River Diversion Dam to Lake Lowell, a reservoir formed by Deer Flat Dam.

Farmers rely on Reclamation water

Boise Project Evolves

Boise River flows varied from raging spring floods to late-summer trickles. A consistent reservoir water supply would improve the farming successes. The Arrowrock site was chosen as the most suitable reservoir location, and Reclamation began construction in 1911. One of the first tasks was to build a housing camp for about 1,400 workers.

Arrowrock camp

A Short-Lived Short Line!

To build Arrowrock Dam, Reclamation joined forces with the Boise and Arrowrock Railroad. The train carried 89,500 passengers and 14 million tons of freight over its 17-mile-long line in the 4½ years it ran. Congress took the railroad out of service in 1916.

A 1,500 kilowatt powerplant at Boise River Diversion Dam provided electricity for the camp and construction of Arrowrock Dam, which began operating in 1915.

People in the growing Boise valley needed more water for irrigation and electricity by the late 1930s. Ways to reduce flooding were also needed. A new dam on the South Fork Boise River, Anderson Ranch Dam, was authorized in 1940, but material and manpower shortages during World War II caused significant delays in its construction. The dam and powerplant finally became operational in 1950.

Delays in developing irrigation for the Payette Division left early settlers on their own; few succeeded. Completion of Black Canyon Diversion Dam in 1924 finally made it possible to divert water from the Payette River. Over time, silt settled in Black Canyon Reservoir, causing frequent flooding of the Montour area. Reclamation purchased the flood plain lands, assisted in moving the residents, and developed wetland areas.

Diverting water and producing electricity from inconsistent Payette River flows was not always possible. Reclamation completed Deadwood Reservoir in 1931 to store water upstream. World War II delayed the completion of Cascade Dam until 1948.

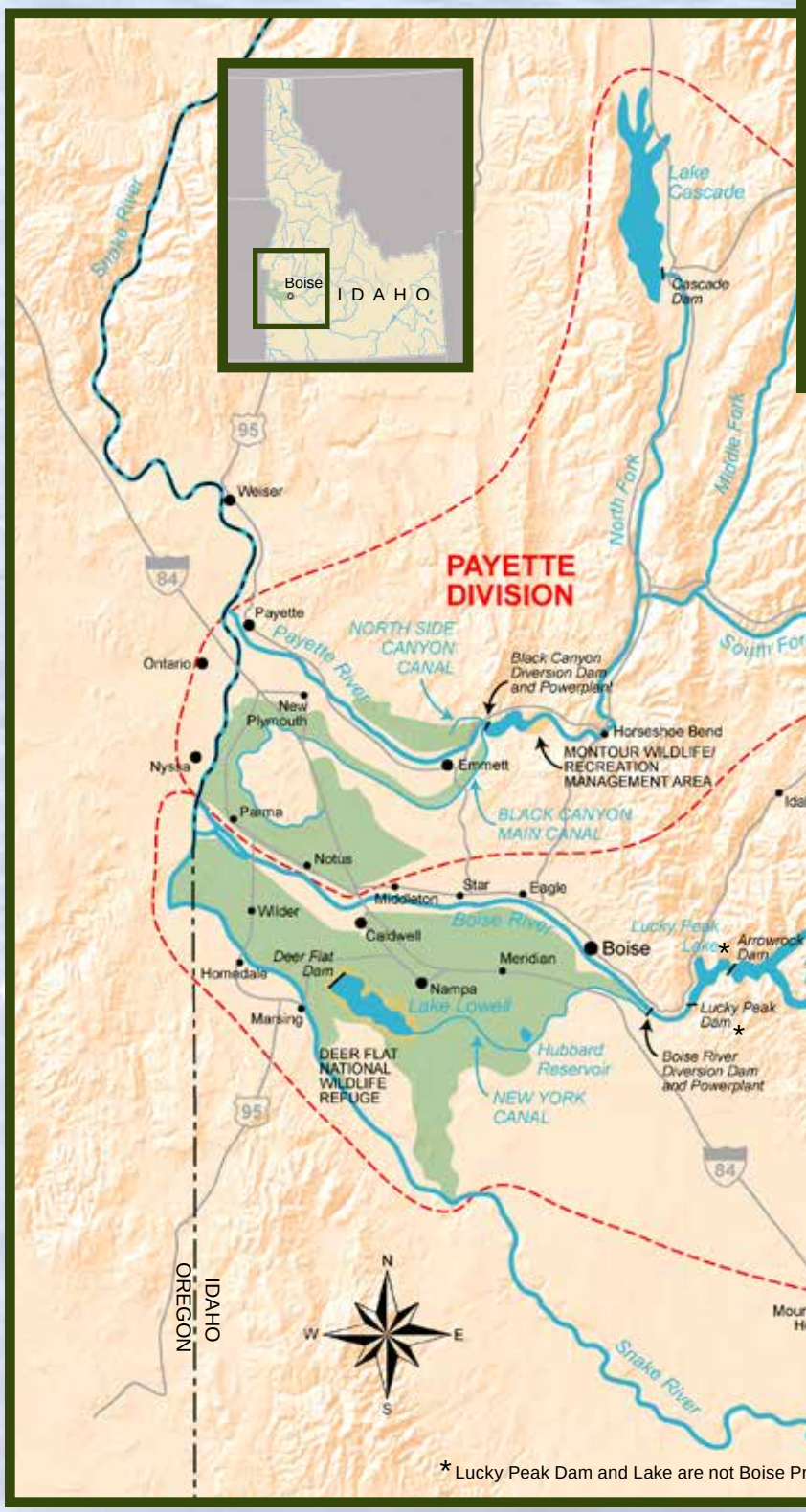
The Boise Project Today

The Boise Project, in southwest Idaho and eastern Oregon, consists of the Arrowrock and Payette Divisions. It includes 6 reservoirs, 2 diversion dams, 3 powerplants, 7 pumping plants, 720 miles of main canals, more than 1,300 miles of smaller canals, and 650 miles of drains. Boise Project Board of Control and Payette Division irrigation districts operate many of the project's facilities.

Producing Electricity

Anderson Ranch Dam, Black Canyon Diversion Dam, and Boise River Diversion Dam include powerplants that generate about 225 million kilowatts of electricity a year. Three Reclamation projects use this generated power, and Bonneville Power Administration sells the rest to its customers.

The Boise Project supplies water to three private powerplants to produce more than 127,000 kilowatts of electricity. The powerplants are located at Cascade, Arrowrock, and Lucky Peak Dams.



* Lucky Peak Dam and Lake are not Boise Project facilities

Anderson Ranch Dam
Constructed: 1941 1950
Height: 456 ft
Crest Length: 1,350 ft
Total Water Storage: 474,900 acre feet

Arrowrock Dam
Constructed: 1911 1915
Height: 350 ft
Crest Length: 1,150 ft
Total Water Storage: 272,200 acre feet

Boise River Diversion Dam
Constructed: 1906 1908
Height: 68 ft
Crest Length: 500 ft

Deer Flat Dams
Constructed: 1906 1911
Total Water Storage: 173,100 acre feet

Black Canyon Diversion Dam
Constructed: 1922 1924
Height: 183 ft
Crest Length: 1,040 ft

Cascade Dam
Constructed: 1946 1948
Height: 107 ft
Crest Length: 785 ft
Total Water Storage: 693,000 acre feet

Deadwood Dam
Constructed: 1929 1931
Height: 165 ft
Crest Length: 749 ft
Total Water Storage: 162,000 acre feet

1 acre foot of water is enough water to cover 1 acre of land 1 foot deep in water, or 325,850 gallons.

Controlling Floods

Cooperation among agencies to operate and release water on the Boise River system protects the Boise valley from historic and frequent flooding. The U.S. Army Corps of Engineers built Lucky Peak Dam in the 1950s to give the Boise valley more flood protection.

Getting Water to Project Lands

The New York Canal carries water from Boise River Diversion Dam to two offstream reservoirs in the Arrowrock Division: Hubbard Reservoir and Lake Lowell. Deer Flat Dam releases water to project lands.

Black Canyon Main Canal diverts water at Black Canyon Diversion Dam to Payette Division lands north and south of the Payette River. North Side Canyon Canal carries water to lands north of the Payette River.

Setting World Records

Arrowrock Dam, a 350 foot high structure, was the highest concrete dam in the world when it was completed in 1915.

Anderson Ranch Dam towers 456 feet above the streambed and was the tallest earthfill dam in the world when it was completed in 1950.

Idaho Potato Commission

Feeding People and Livestock

Farmers using Boise Project facilities turned about 390,000 acres into one of the West's most productive farming regions. The project carries water to only 7 percent of Idaho's total irrigated lands, but produces the majority of the State's total profits from agricultural income. Project farmers grow much of the Nation's sweet corn seed, potatoes, other row crops, and fruit. Hay and forage crops support cattle and even some domestic buffalo and elk.

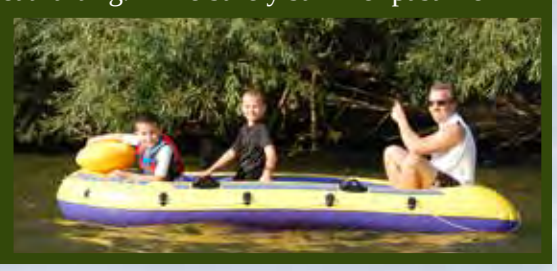
Fun in the Great Outdoors

Boise Project offers 78 square miles of reservoir water surface used for recreation, fish, and wildlife. Camping facilities are available at or near all the project reservoirs. Excellent fishing for trout, smallmouth bass, and kokanee salmon draws visitors to the reservoirs. Lake Cascade and Deadwood Reservoir have both produced State fishery records. Ice fishing is a popular wintertime activity.

Lake Cascade is the largest Reclamation reservoir in western Idaho and receives more than 300,000 visitors annually.

Enjoying the Rivers

Each summer, thousands of river enthusiasts enjoy rivers within the project. The Payette River offers world class kayaking and great rafting. A leisurely summer pastime in the Boise valley is to float a 6 mile section of the lower Boise River.



A Historic Place

Boise River Diversion Dam and powerplant are on the National Register of Historic Places because of their important historic and technological contribution in developing the Boise Valley.

Water for Cities and Industry

Boise Project provides water from Anderson Ranch Reservoir for residential and industrial use in the Boise valley.

Enhancing Fish and Wildlife

Lake Cascade, Deadwood Reservoir, Anderson Ranch Reservoir, and Lucky Peak Lake provide water to enhance fish and wildlife in the Boise and Payette Rivers. Water levels in Deadwood Reservoir and Lake Cascade are maintained to protect water quality and fish resources that support bald eagles, osprey, and other wildlife.

Reclamation's Idaho projects face the significant challenge of managing water for endangered species while delivering irrigation water. Reclamation complies with the Endangered Species Act and State water law in operating and maintaining its facilities.

Benefits of the Columbia Basin Project

In addition to storing and carrying water for irrigation, producing electricity, controlling floods, providing recreation, and regulating streamflow, the Columbia Basin Project also provides water for cities, industries, navigation, and endangered species.

What's the Yearly Value?

Irrigated crops: $870 million
Power generated: $950 million
Recreation: 3 million visits - $50 million

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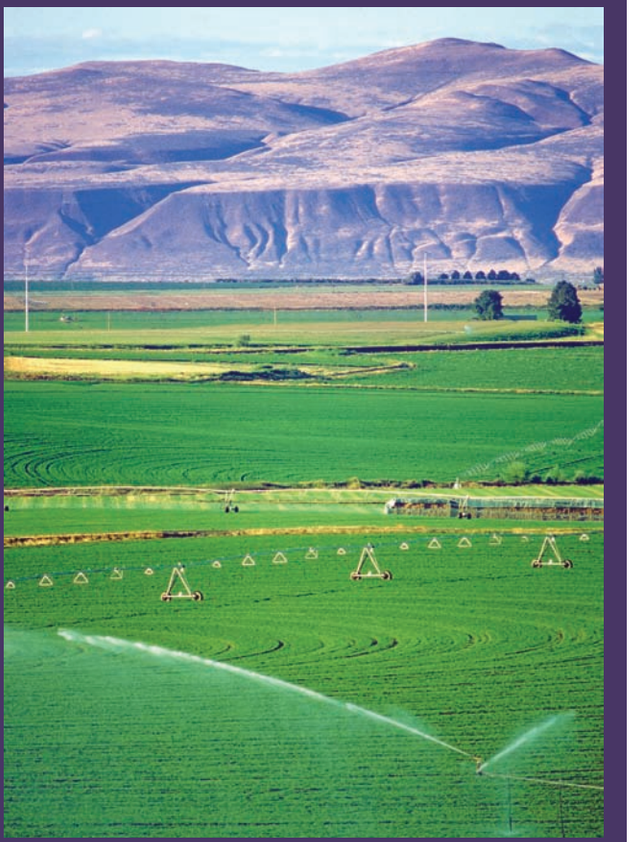
December 2008

RECLAMATION

Managing Water in the West

The Story of the Columbia Basin Project

WASHINGTON



U.S. Department of the Interior
Bureau of Reclamation

Ice Age Forces Shape the Landscape

About 10,000 years ago, a huge glacier dammed a river gorge in Idaho creating a 3,000 square mile lake in western Montana. When the ice dam broke, a wall of water nearly 2,000 feet high and traveling 65 miles per hour carved new river paths across Idaho, Washington, and Oregon in a matter of days. Ancient ravines were left high and dry above today's Columbia River after the water receded. Over time, the wind gradually deposited a rich layer of soil.

Early Settlers

In the early 1900s, many settlers homesteaded the dry plateaus of eastern Washington and began dryland farming. But the area's average annual precipitation of 6-10 inches doomed their efforts to failure despite an ample growing season and soils well suited for crops. Many settlers abandoned their farms while others tried to develop irrigation water supplies. The plans often proved too costly or difficult for private groups.

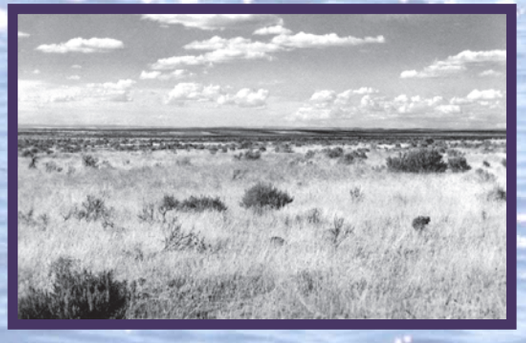
How It All Started

Congress passed the Reclamation Act in 1902 to boost development of the arid West. Reclamation began its task of creating water storage and irrigation networks by looking into locally supported projects.

Several groups proposed irrigation projects for the Columbia plateau. One plan used gravity to bring water from the Pend Oreille River in northern Idaho and eastern Washington. Others suggested pumping water from the Columbia River into the ancient riverbed known as the Grand Coulee.

Miles From Nowhere

President Roosevelt gave Reclamation permission in 1933 to begin building Grand Coulee Dam to create jobs and provide inexpensive power. The first step was to build a town for workers and a railroad for hauling supplies. Work on the dam and powerplants continued day and night through World War II.



Typical landscape before irrigation

Congress authorized the Columbia Basin Project in 1943, although building the irrigation system did not start until after the war. The first irrigation water pumped from the Columbia River near Pasco in 1948 was delivered to about 5,400 acres. The irrigation system carried its first water from Grand Coulee Dam to about 66,000 acres in the spring of 1952. Extending canals and adding pumping plants and other features continued for about 30 years.

Water Used At Least Twice

Water that irrigates project land is often used again before it returns to the Columbia River near Pasco. Potholes Reservoir collects runoff from the north for farms in the south. Water from drains and wasteways returns to the canal system for reuse. Irrigators use about 2.5 million acre-feet of Columbia River water each year. Water reuse gives them an additional 1 million acre-feet.

Food For Your Table

Although some grow wheat and other grains, many Columbia Basin Project farmers grow high value fruits, vegetables, and specialty crops like mint and wine grapes. Agriculture-related businesses account for 30-50 percent of all income in counties served by the project.

High value crops include cherries

Several Agencies, Many Purposes

The Bureau of Reclamation works with the U.S. Army Corps of Engineers and Bonneville Power Administration to coordinate operations at Grand Coulee Dam and other Columbia River dams to produce power, prevent flooding, and provide irrigation water, benefits to fish and wildlife, and recreation.

Controlling Floods

The 1964 Columbia River Treaty between the United States and Canada allowed both countries to build more reservoirs to store and share water. This greatly reduced the risk of flooding for cities along the Columbia River. It also led to producing more electricity in the energy-short 1970s.

The Plumbing

The Columbia Basin Project includes 330 miles of main canals, 1,990 miles of smaller canals, and 3,500 miles of drains and wasteways served by more than 240 pumping plants that carry water to some 10,000 farms.

Keeping the Lights On

Grand Coulee Dam's powerplants produce an average of 21 billion kilowatt-hours of electricity each year. This is about 11 percent of the power requirements of the Pacific Northwest.

Grand Coulee Dam

Constructed: 1933-1942 & 1967-1974
Height: 550 ft
Length: 5,223 ft
Water Storage (Franklin D Roosevelt Lake): 9½ million acre-feet
Generating Capacity: 6,809 mW

Dry Falls Dam/ North Dam

Constructed: 1929/1951
Height: 145 ft/123 ft
Length: 1450 ft/9800 ft
Water Storage (Banks Lake): 1,275,000 acre-feet

O'Sullivan Dam

Constructed: 1949
Height: 200 ft
Length: 1900 ft
Water Storage (Potholes Reservoir): 511,700 acre-feet

* Priest Rapids, Chief Joseph and Wanapum Dams are not Columbia Basin Project facilities.

Fun in the Sun

Franklin D. Roosevelt Lake is the largest lake on the project. It stretches 151 miles from Grand Coulee Dam north to the Canadian border. Part of the lake is a National Recreation Area. The lake is managed by the National Park Service, Coville Confederated Tribes, Spokane Tribe of Indians, Bureau of Indian Affairs and Bureau of Reclamation.

Franklin D. Roosevelt Lake offers many campgrounds plus swimming beaches, boat ramps and docks, houseboat and fishing boat rentals, fuel, and food. The lake supports more than 30 fish species.

Banks Lake is the starting point for the project's irrigation water delivery system. This reservoir is a popular attraction for fishermen, boaters, and other recreationists. Steamboat Rock State Park is one of the more popular facilities in Washington State. Potholes Reservoir is valued for its recreation as well as for its original irrigation purpose.

Producing Electricity

Grand Coulee Dam first produced electricity in 1941. Hydroelectricity is produced when the energy of falling water turns a turbine connected to a generator. Bonneville Power Administration sells this electricity to repay expenses of building and maintaining the project. Grand Coulee Dam is the largest hydroelectric plant in North America generating 2.7 times the electricity produced at Hoover and Glen Canyon Dams combined.

Irrigating the Land

Twelve of the world's largest pumps lift water from Franklin D. Roosevelt Lake into a feeder canal and Banks Lake.

The water then flows through a main canal and the Bacon Siphons and Tunnels to more than 670,000 acres of project cropland. Seven small hydroelectric plants built by the irrigation districts help finance conservation and capital improvement projects.

Columbia National Wildlife Refuge

Northwest Trek Wildlife Park

Some of the wetlands created by the project are part of the Columbia National Wildlife Refuge. Ducks, geese, sandhill cranes, and other birds gather at the refuge or pass through it during migration.

What About the Fish?

Dr. Ernest Keeley, Idaho State University

Grand Coulee Dam releases water to increase river flow to help salmon and steelhead migrate. Improvements in water measurement, irrigation methods, and agricultural practices are also improving river conditions for fish and the overall environment of the region.

Water Flows Both Ways!

Six of the twelve pumps at Grand Coulee Dam are also generating units that can reverse the direction water flows. They lift water *uphill* for irrigation storage. Then when additional electricity is needed, they return water *downhill* to produce electricity.

Water, Water Everywhere

Natural channels and canals carry water to smaller project reservoirs–Billy Clapp Lake, Soda Lake, and Scooteney Reservoir. Each reservoir stores irrigation water and provides additional wildlife habitat and recreational opportunities such as camping, boating, swimming, fishing, nature study, and hunting. There are more than 300,000 acres of lakes and wetlands within the Columbia Basin Project.

Many Benefits

Minidoka Project reservoirs store flow of the Snake River system for later irrigation use, electricity production, and to reduce flood damage. The project also provides fish and wildlife enhancement and some of the best outdoor recreation opportunities in the West.

What's the Yearly Value?

Irrigated crops: $622 million
Livestock industry: $342 million
Power generated: $5.6 million
Flood damage prevented: $8.8 million
Recreation: over 674,000 visits - $25 million

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www.usbr.gov/pn Upper Snake Field Office (208) 678 0461

September 2010

RECLAMATION
Managing Water in the West

The Story of the

Minidoka Project

IDAHO–WYOMING

Railroad Draws Settlers

Pioneer farmers immigrated to eastern Idaho in the mid-to-late 1800s. Construction of the Oregon Short Line Railroad, completed in 1882, brought many workers who settled in Minidoka. More and more people came by rail to the Snake River valley.

Landscape before irrigation

The arid landscape, largely sagebrush, got little more than 10 inches of annual rainfall. However, the fertile silt and sandy loam soils were perfect for farming. Early farmers quickly realized how productive the area could be with adequate water. Rigby and Rexburg grew as farming communities with small, moderately successful irrigation systems.

An early survey crew

Early Government Involvement

The valley's agricultural successes fit perfectly with the Federal government's interest in settling the West. The U.S. Geological Survey surveyed the Minidoka area in 1889-1890 for potential large irrigation projects. State and private interests investigated further and provided the driving force for a large irrigation development.

Congress passed the Reclamation Act in 1902 to bring water to the arid West. The Act provided the technical means and the money to develop large-scale irrigation projects. The Act also specified that those who receive irrigation water and power from Reclamation projects would pay part of the construction costs and ongoing operation and maintenance costs.

The Secretary of the Interior authorized the Minidoka Project, one of Reclamation's earliest projects, in 1904 to provide irrigation water and generate electricity.

Minidoka Dam in 1911

The Project's Early Days

Reclamation started building Minidoka Dam on the Snake River in 1904. Several project canals and farm delivery systems were built by 1906. Minidoka Dam powerplant began generating electricity in 1909, and Lake Walcott started supplying irrigation water that same year.

The 1911 Jackson Lake Dam

Reclamation completed a temporary dam in 1907 at the site of Jackson Lake in Wyoming to begin storing project water. The 1911 permanent dam was modified and enlarged several times over the years. The capacity for storing water also increased with the modifications.

Minidoka Project continued to grow with construction of American Falls, Island Park, and Grassy Lake Dams between 1927 and 1939.

Moving A City

Building American Falls Dam would put most of the town of American Falls under water. Reclamation purchased land the reservoir would flood and land for relocating the city and its residents.

World War II Camp

During World War II, the U.S. government removed thousands of Japanese-Americans from their West Coast homes and relocated them to remote camps. The Hunt Site, in Jerome County, Idaho, housed over 9,300 people during the war. The evacuees built and repaired portions of the Minidoka Project's canal system and assisted in clearing the land and

Hunt Site barracks

The learning continued

planting crops. After the war, Reclamation offered the camp buildings and equipment to war veterans, including Japanese-Americans, who settled on the project. The National Park Service now manages the Minidoka Internment National Monument to preserve this historic site.

Irrigation Brings Crops to an Arid Desert

Take fertile soil, favorable topography, an average 200 day growing season, and add the irrigation water provided by Minidoka Project the result is 19,000 farms on more than 1.1 million acres of land stretching some 300 miles from Ashton to Bliss along both sides of the Snake River. These lands are responsible for most of southeastern Idaho's agricultural economy–millions of dollars worth of world famous potatoes, grains, vegetables, cereals, forage crops, dairy farming, and livestock production. Water users and electricity sales will, over time, pay about 70 percent of the total project construction costs.

Fun for Everyone

Minidoka Project's 5 reservoirs offer more than 100,000 acres of water surface and 320 miles of shoreline. Jackson Lake, in picturesque Grand Teton National Park, is the most popular project attraction. Fishing, boating, waterskiing, camping, hunting, picnicking, and sightseeing are favorite activities.

Sections of the Snake River between Jackson Lake and American Falls are nationally known for exceptional white water rafting and kayaking. South Fork and Henrys Fork Snake River offer premier trout fishing.

Preventing Flood Damage

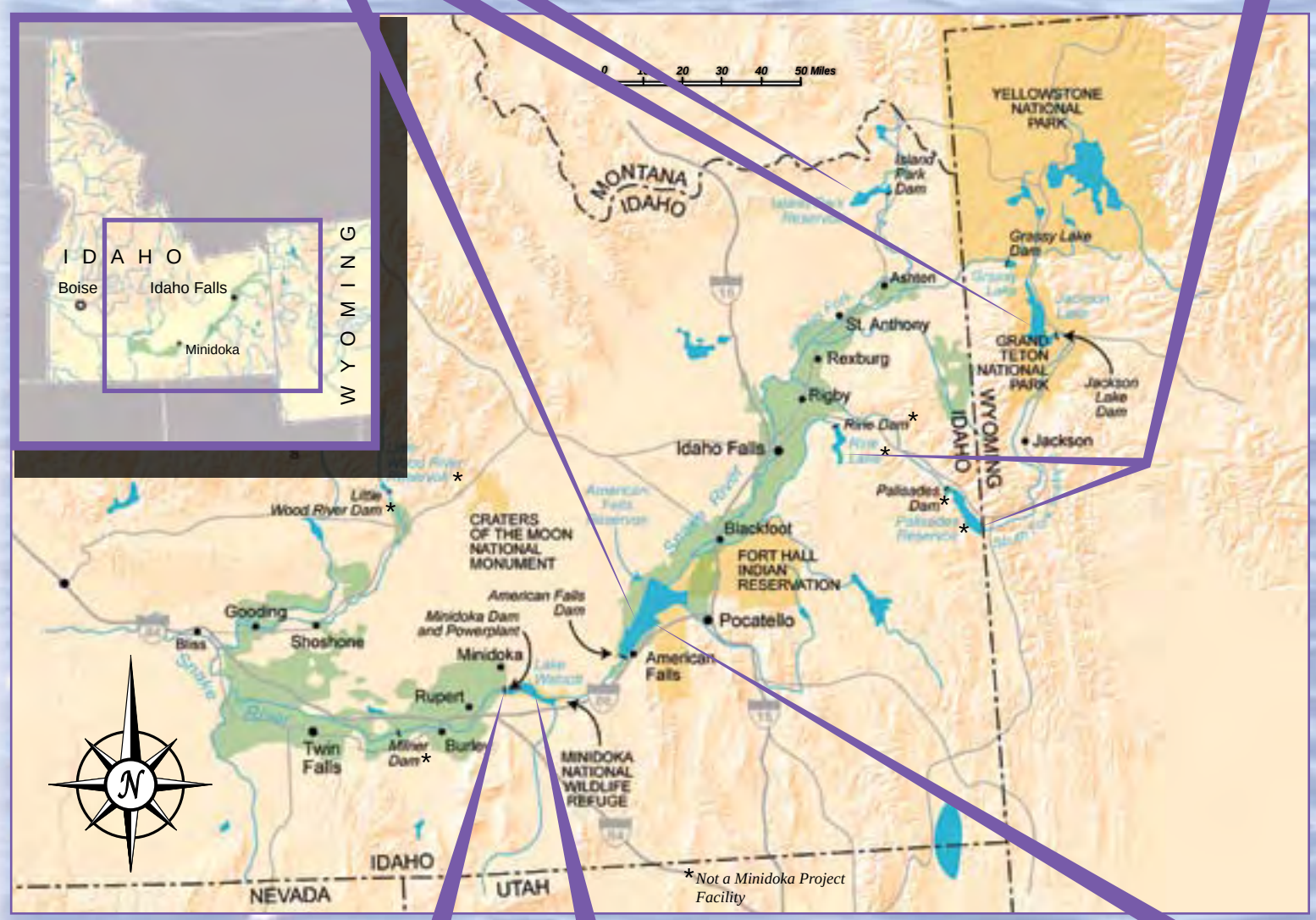
A formal agreement between Reclamation and the U.S. Army Corps of Engineers regulates reservoir storage in Jackson Lake to provide a buffer against flooding. American Falls and Island Park Reservoirs are filled, based on expected snowmelt and precipitation. Excessive runoff that is temporarily stored in the reservoirs is then gradually released to prevent downstream flooding along the Snake River.

Across State Lines

Idaho, Wyoming, and Reclamation cooperate to provide the most efficient uses of Snake River water and to equitably divide the water between the two states.

Other Reclamation Projects Contribute

Reclamation's Palisades and Ririe Projects contribute to Minidoka Project by providing additional irrigation water during dry years and additional flood protection.



Minidoka Dam

- Constructed: 1904 1906
- Height: 86 ft
- Length: 4,475 ft
- Water Storage (Lake Walcott): 95,180 acre feet
- Generating Capacity: 28,000 kW

American Falls Dam

- Constructed: 1925 1928, replaced in 1977
- Height: 104 ft
- Length: 5,277 ft
- Water Storage (American Falls): 1,672, 600 acre feet
- Generating Capacity: 112,420 kW (Non Federal)

Island Park Dam

- Constructed: 1937 1939
- Height: 94 ft
- Length: 9,500 ft
- Water Storage (Island Park): 135,500 acre feet
- Generating Capacity: 4,800 kW (Non Federal)

Grassy Lake Dam

- Constructed: 1937 1939
- Height: 118 ft
- Length: 1,170 ft
- Water Storage (Grassy Lake): 15,182 acre feet
- Generating Capacity: None

Jackson Lake Dam

- Constructed: 1907, raised in 1916
- Height: 65.5 ft
- Length: 4,920 ft
- Water Storage (Jackson Lake): 847,000 acre feet
- Generating Capacity: None

Making Electricity

Minidoka Dam Powerplant, one of the first Federal power developments, is listed on the National Register of Historic Places. The Allen E. Inman Powerplant, added in 1997, replaced some of the original units and raised the generating capacity to 27,700 kilowatts. Water upstream from Minidoka Dam passes through the powerplants to generate about 150 million kilowatt hours of electricity each year– enough to serve a town the size of Blackfoot. Bonneville Power Administration sells the electricity not needed by the project.

Enhancing Fish and Wildlife

Minidoka Project reservoirs provide excellent habitat for fish and wildlife. Millions of waterfowl nest in or migrate through the Minidoka National Wildlife Refuge on Lake Walcott each year.

Project reservoirs provide water to maintain streamflow for river fisheries in the Snake and Columbia Rivers. This water comes from reservoir space and natural flow that Reclamation purchases from willing sellers and Idaho water rental pools.

Many Wetlands – Many Benefits

Minidoka Project wetlands improve water quality, allow water reuse, and provide additional wildlife habitat. Wetlands filter runoff water and irrigation return flow as it moves through the vegetation. Wetlands also help water enter and recharge the groundwater aquifer.

The Project's Largest Reservoir

American Falls Reservoir is the project's largest storage reservoir and holds up to 1.7 million acre feet of water.

Crops As Far As The Eye Can See

Minidoka Project, in southeastern Idaho and northwestern Wyoming, has 5 storage reservoirs, 2 diversion dams, 2 powerplants, 4 pumping plants, 103 miles of main canals, 815 miles of smaller canals, and more than 170 water supply wells. The combined water storage available for project use is more than 4 million acre feet. Water from deep wells in the Snake River Plain Aquifer adds to the irrigation water supply during dry years. These facilities significantly influenced growth in southeastern Idaho by bringing water to the land and prosperity to the area. Additional private facilities are operated as part of the project.

Benefits of the Owyhee Project

Owyhee Project stores natural flow of the Owyhee River to irrigate the arid desert. It reduces flood damage and provides water for fish and wildlife, recreation opportunities, and to generate electricity.

What's the Yearly Value?

Irrigated crops: $135 million
Livestock industry: $81 million
Recreation: 155,000 visits - $4.2 million
Flood damage prevented: $657,000

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August 2009

RECLAMATION
Managing Water in the West

The Story of the Owyhee Project

OREGON–IDAHO

U.S. Department of the Interior
Bureau of Reclamation

Early Settlers

The 1862 discovery of gold brought miners and pioneers to the arid desert lands of southeastern Oregon and southwestern Idaho. Farms developed in nearby river valleys where water was easily obtained. By the early 1900s, private diversions from the Owyhee and Snake Rivers irrigated about 6,000 acres used to produce fruit and alfalfa and raise livestock. As more people came to the region, farmers developed land farther from the rivers.

An early wheat harvest

Private Irrigation Projects

Private organizations became interested in developing a reservoir to provide late-season irrigation water and to irrigate additional lands at higher elevations. Potential sites were remote and hard to reach. Small, primitive irrigation projects sprang up throughout the area. Success was often marginal. But, private interests were unable to raise enough money to build a dam at one of these remote sites or to develop a large-scale irrigation project.

An Agency is Born

To assist farmers with irrigation development, Congress passed the Reclamation Act of 1902, establishing what is now the Bureau of Reclamation. The Act specified that those who receive irrigation water from Reclamation projects would pay part of the costs for constructing, operating, and maintaining those projects. From 1903 to 1905, Reclamation surveyed Owyhee River basin lands that had potential for irrigation.

Reclamation Helps Farmers

Reclamation investigated various reservoir sites and irrigation plans while local farmers worked toward irrigating their land. Many pumped water directly from the river. The high cost of pumping led water users to enter into repayment contracts with Reclamation for the cost of constructing the Owyhee Project. President Coolidge approved the project in 1926 for the sole purpose of irrigation.

Difficult working conditions

New Construction Methods

Workers started building the project's only storage dam and the canal system in 1928. Owyhee Dam, standing 417 feet above the riverbed, ranked as the world's highest dam when it was completed in 1932. Engineers used the dam as a proving ground for the design and upcoming construction of the huge Hoover Dam (726 feet high) which, because of its size, would require new construction methods.

Owyhee Dam on the rise

First Water Delivered!

Project facilities delivered the first irrigation water in 1935. The canal system reached the entire project area by 1939, bringing more lands into production.

Farming – a family affair

Changing to Meet Needs

As the West grew and changed, so did public interests and the project benefits. While the Owyhee Irrigation District still operates Owyhee Dam specifically for irrigation, the water is also used by fish and wildlife, recreationists, and three private powerplants. Flood protection became another valuable benefit.

By the Numbers

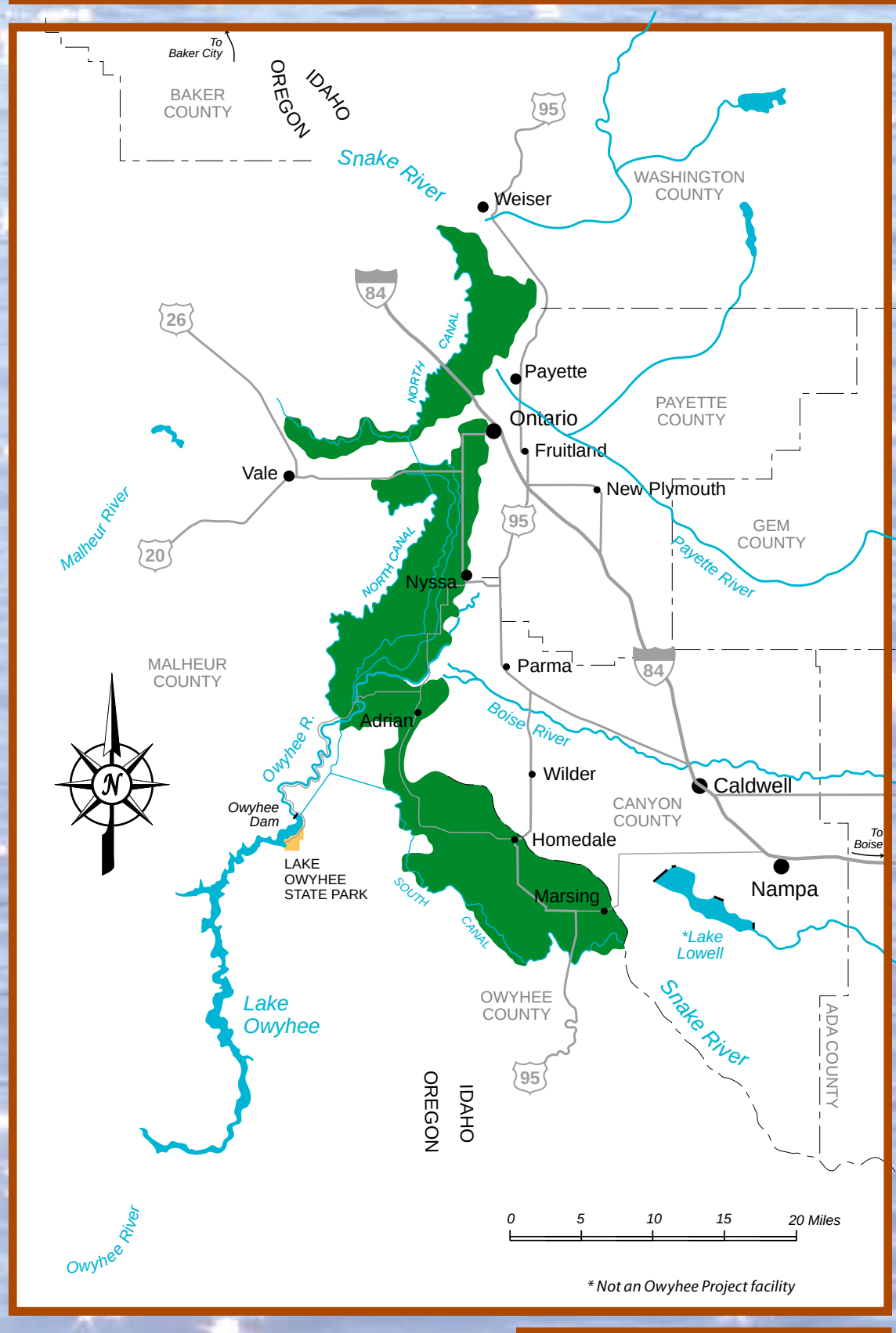
- Constructed: 1928-1932
- Structural Height: 417 ft.
- Crest Length: 833 ft.
- Water Storage (Lake Owyhee): 1,120, 000 acre-ft.
- Crest Elevation: 2675 ft.
- Base Width: 265 ft.
- Crest Width: 30 ft.
- Volume of Concrete: 537,500 cu yd.

Owyhee Project Today

The project consists of Owyhee Dam, the 53-mile-long Lake Owyhee, pipelines, tunnels, 9 pumping plants, and more than 900 miles of canals and drains. The Owyhee Irrigation District, in cooperation with the South Board of Control, operates and maintains the project facilities. Reclamation cooperatively works with other agencies to improve streamflow and water quality.

How Do the Farms Get Water?

Lake Owyhee stores the natural flow of the Owyhee River for later use on project lands. Nearly 8 miles of tunnel divert reservoir water to canals and farmlands. Pumps lift water from the Snake River for delivery to more than 30,000 acres of farmland.



Irrigation Water = Crops

Fertile lands, a favorable climate, and a good irrigation water supply produce abundant crops on more than 118,000 acres west of the Snake River in Malheur County, Oregon, and Owyhee County, Idaho. Onions, grains and forage, sugar beets, potatoes, beans, and sweet corn and alfalfa seed are all grown on project lands. This crop production is closely tied to agricultural products, processing, marketing, and transport industries around Ontario, Oregon, and Boise, Idaho. Livestock and dairy industries use these crops and contribute millions of dollars to the local economy.

Reducing Flood Damage

The drainage basin upstream from Owyhee Dam contains more than 11,000 square miles and has an average annual runoff of about 860,000 acre-feet. Up to 100,000 acre-feet of reservoir space in Lake Owyhee is used to reduce downstream flooding along the Owyhee and Snake Rivers.

An Unusual Spillway

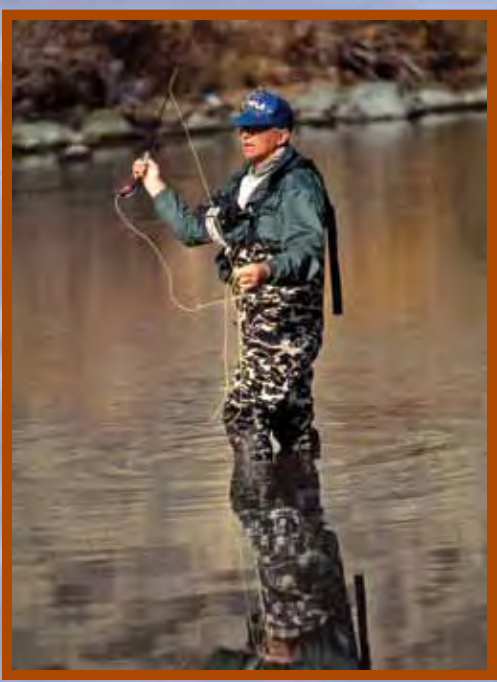
The glory hole spillway works like a bathtub drain to lower the reservoir water surface if rain or snowmelt fill the reservoir. Water overflowing the spillway drops more than 300 feet into a tunnel and enters the Owyhee River downstream from the dam.

A Wild River Ride

The Owyhee River's National Wild and Scenic River corridor passes through southeastern Oregon and enters Lake Owyhee. Recreationists ride rapids in parts of a 120-mile-long corridor through rugged, remote canyon lands. The river offers outstanding scenery, recreation, geology, wildlife, and cultural values.

Private Powerplants

Owyhee Irrigation District manages three private powerplants built on Owyhee Project facilities between 1985 and 1993. These powerplants generate a combined total of 15,000 kilowatts of electricity used by power customers in Idaho and Oregon.



Spectacular Beauty

The 1.12 million acre-foot Lake Owyhee offers nearly 13,000 acres of water surface and 150 miles of shoreline in a remote, rugged, and spectacular canyon. Oregon State Parks, Malheur County, and Bureau of Land Management manage boat ramps at Lake Owyhee. Lake Owyhee State Park offers camping at two locations on or near the lake shore. Excellent fishing, boating, waterfowl, and upland game bird hunting attracts many recreationists throughout the year.

Visitors can watch a variety of wildlife such as wild horses, bighorn sheep, golden eagles, pelicans, and cormorants.

USDA, Wilson

Benefits of the Yakima Project

The Yakima Project has been a driving force in the economic status of the valley for almost a century. The project irrigates crops, generates power, reduces flood damage, and supports area recreation.

What's the Yearly Value?

Irrigated crops: $1.3 billion
Livestock industry: $494 million
Power generated: $3.4 million
Flood damage prevented: $40 million
Recreation: over 1.64 million visits - $55 million

Kachess Lake in late summer

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

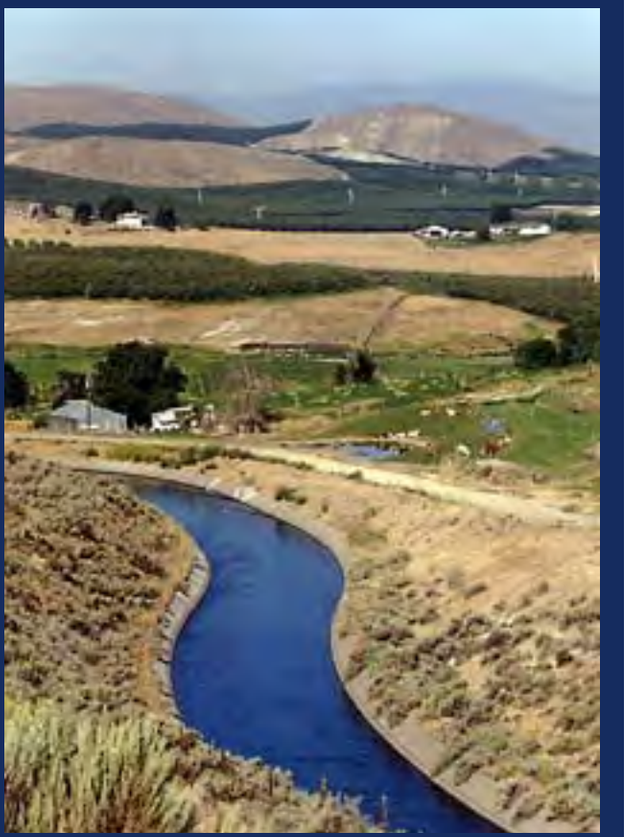
www.usbr.gov/pn Yakima Field Office (509) 575 5848

April 2011

RECLAMATION
Managing Water in the West

The Story of the Yakima Project

WASHINGTON



U.S. Department of the Interior
Bureau of Reclamation

From a Desert to an Orchard

Delicious apples. Award-winning wines. Trellises of hops. Fields of cool mint. What was sagebrush-covered land only a few generations ago is now one of the richest agricultural areas in the Nation. How did this desert blossom into a fruitbowl?

Nature blessed the Yakima Valley with a mild climate and rich soils, but less than 7 inches of annual rainfall kept the land arid. Wild game, fertile land, and grass for cattle lured settlers to the valley in about 1860. They quickly recognized the value of water in the many rivers and streams that tumbled from the slopes of the Cascades. In 1864, the valley's first irrigation ditch delivered creek water to a vegetable garden above a Catholic mission. The transformation had begun.

Sorting apples in an early orchard

An Agricultural Boom

Private water companies irrigated potatoes, wheat, hops, and alfalfa on ever-larger tracts of land in the 1870s and 1880s. Then, in 1886, the Northern Pacific Railroad rumbled into the valley. Local farmers began shipping crops to distant markets. Agriculture boomed and so did irrigation. By 1900, over 120,000 acres used irrigation water. There were more fertile lands to irrigate, but the natural flow in the river was insufficient.

Half a Century in the Making

Congress passed the Reclamation Act in 1902 to help develop the arid West. Reclamation began creating water storage and irrigation networks by looking into locally supported projects. The Yakima Valley citizens wanted more dependable water supplies to help them further develop the valley's agriculture. In 1903, they petitioned the Secretary of the Interior for help. This marked the beginning of the Yakima Project.

Between 1905 and 1958, Reclamation built several river diversions and canals. The project includes six reservoirs that catch and hold over a million acre-feet of spring runoff in the Cascade Mountains. In a normal water year, this provides a reliable water supply for Yakima Valley farmers for the entire growing season.

Building on Natural Lakes

Four of Reclamation's Yakima Project reservoirs were built at existing mountain lakes. Cle Elum Dam closed a 60,000-year-old break in a natural glacial dam. Bumping Lake, Kachess, and Keechelus Dams store additional water in natural lakes. These reservoirs help reduce downstream flood damage.

A Shift in Irrigation

As the irrigated lands matured, the earlier staples of potatoes and wheat became less profitable. Farmers began growing fruits, such as apples and grapes. Soon, the valley's rolling pastures and farms became a forest of orchards and trellises, with dairy farms and grazing sheep scattered throughout.

Cattle grazing near hops trellises

Keeping the Dams Safe

The project's major dams were built between 1910 and 1933. As they age, Reclamation keeps a watchful eye through the Safety of Dams program to ensure the dams meet modern safety standards. In the last 30 years, Reclamation has modified Bumping Lake, Cle Elum, Clear Creek, Kachess, and Keechelus Dams under this program.

Kachess Dam and Lake

Paying for the Project

The Chandler and Roza hydroelectric powerplants use project water to generate power. The Bonneville Power Administration sells this power to help repay the costs of building the project. Water users, organized into several irrigation districts, also help pay these costs. Ultimately, water users and revenues from power generation will repay about 97 percent of the total construction costs.

Protecting Fish and Wildlife

Congress created the Yakima River Basin Water Enhancement Project to make the Yakima Project more friendly to the environment. Over several decades, fish passage in the Yakima Valley has evolved from an art to a science. Reclamation builds fish ladders and fish screens to help protect salmon, steelhead, and bull trout. Under the Water Enhancement Project, Reclamation purchases or leases water from willing sellers to leave in the rivers for fish and wildlife.

Bumping Lake Dam
Constructed: 1909 1910
Height: 61 feet
Crest Length: 3,425 feet
Water Storage (Bumping Lake):
33,700 acre feet

Cle Elum Dam
Constructed: 1931 1933
Height: 165 feet
Crest Length: 1,800 feet
Water Storage (Cle Elum Lake):
436,900 acre feet

Clear Creek Dam
Constructed: 1914 1915
Height: 83 feet
Crest Length: 404 feet
Water Storage (Clear Creek):
5,300 acre feet

Kachess Dam
Constructed: 1910 1912
Height: 115 feet
Crest Length: 1,400 feet
Water Storage (Kachess Lake):
239,000 acre feet

Keechelus Dam
Constructed: 1913 1917
Height: 128 feet
Crest Length: 6,550 feet
Water Storage (Keechelus Lake):
158,000 acre feet

Tieton Dam
Constructed: 1917 1925
Height: 319 feet
Crest Length: 920 feet
Water Storage (Rimrock Lake):
198,000 acre feet

1 acre-foot of water is enough water to cover 1 acre of land 1 foot deep in water, or 325,850 gallons.

Fishing Opportunities

Fishing occurs both in the project reservoirs and in the Yakima River downstream from the reservoirs. Anglers catch trout and kokanee in the mountain lakes and reservoirs. They catch trout, salmon, and small mouth bass in the Yakima River.

Recreation: Something for Everyone

Surrounded by thick, evergreen forests, the project's reservoirs nestle jewel like into the rugged Cascade terrain. The major reservoirs are surrounded by the Mt. Baker Snoqualmie and Wenatchee National Forests.

Each year, almost two million recreation enthusiasts converge on the project's reservoirs for camping, hiking, swimming, boating, rafting, and fishing. The water has also created habitat for resident and migratory birds such as ducks, geese, cranes, eagles, and osprey.

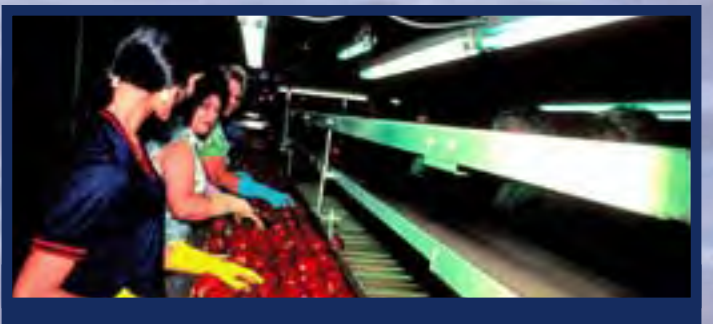
Almost Anything Will Grow

With a little water, almost anything will grow in the Yakima Valley. Project lands boast some 60 different crops, including wheat, alfalfa, hops, peppermint, spearmint, asparagus, sweet corn, grapes, apples, cherries, pears, and peaches.

The wide variety of fruit, vegetables, seeds, field crops, and cereal grains make the Yakima Valley one of the top agricultural producers in the country. Yakima County ranks first in the United States in apple, mint, and hops production.

Water for Residents

Yakima Project water finds its way to serve nearly everyone in the valley. More than 250,000 people receive some type of water service from the project. The Wapato Irrigation Project, operated by the Bureau of Indian Affairs, is one of the largest groups receiving water. The project irrigates over 130,000 acres on Yakama Nation lands south of Yakima.



Spinoff Industries

The project is an economic giant. Irrigated agriculture has created spinoff industries, such as canneries, wineries, creameries, fruit packing plants, and juice factories to process locally grown crops.

Generating Power

The powerplants at Chandler and Roza generate a combined 105 million kilowatt hours of electricity per year. This is enough electricity to supply almost 8,000 typical homes.