

Yellowtail

U.S. Department
of the Interior
Water and Power
Resources Service

Wyoming-Montana
Water
Resource
Project



A Pick-Sloan Missouri Basin Program Unit

The Yellowtail Unit is located on the Bighorn River in southcentral Montana, about 43 air miles southeast of Billings. Construction was carried out as part of the Pick-Sloan Missouri Basin Program—an overall plan to utilize the waters of the Missouri River Basin. Key feature of the unit is Yellowtail Dam, which rises 525 feet between the rugged Bighorn Canyon walls. The dam, a tall, variable-thickness arch-type, is the highest in the Missouri River Basin and creates one of the largest capacity reservoirs—1,375,000 acre-feet—on the tributary system of the Missouri River.

The reservoir, named Bighorn Lake, was developed to provide generation of power, irrigation, recreation, fishery enhancement, sediment retention, municipal and industrial water, and flood control.

The prime contract for construction of the dam was awarded in April 1961, and the last bucket of concrete was placed in the dam during October 1965. Yellowtail Dam and the Bighorn Canyon National Recreation Area were dedicated on October 31, 1968.

Power

A powerplant at the base of the dam occupies nearly the entire width of the riverbed. The plant houses four 62,500-kilowatt generating units,

driven by four 87,500-horsepower turbines producing an average of about 1 billion kilowatt-hours of energy annually. Water power is supplied to each unit by separate 12-foot-diameter penstocks through the dam. Guided tours through the dam and powerplant are conducted during the summer months by the Water and Power Resources Service.

On the east rim of the canyon, high above the dam, is the switchyard through which electrical power and energy is delivered to the Western Area Power Administration's Missouri River Basin power system. Power is transmitted from the powerplant to the switchyard by insulated cables enclosed in two 1,800-foot-long underground, oil-filled, high-pressure pipes.

Power delivery from the Yellowtail switchyard is made to the Pick-Sloan Missouri River Basin Program's western division area through 115-kilovolt lines to Wyoming and by a 230-kilovolt inter-connections to the Pacific Power and Light Company and the Montana Power Company transmission systems. Power is delivered to the Eastern Division over a 230-kilovolt line through a substation near Custer, Montana.

Production at the 250,000-kilowatt plant is fully integrated with the more than 2,500,000 kilowatts of hydro-power capacity from other Federal developments in the Missouri River Basin. More than 10,000 miles of Federal transmission lines carry this

power to major wholesale load centers for further distribution by local suppliers to the farms, homes, and cities of the basin.

Irrigation

The potential Hardin Unit is a 43,500-acre strip of land, 2 to 3 miles wide, which is suitable for irrigation. Beginning about a mile and a half below the dam, it extends 40 miles downstream and is now primarily dryfarmed or used for native pasture. However, since providing additional water would permit production of such diversified crops as sugar beets, beans, alfalfa, and irrigated pasture, provision was made during design and construction of the dam for a future irrigation system.

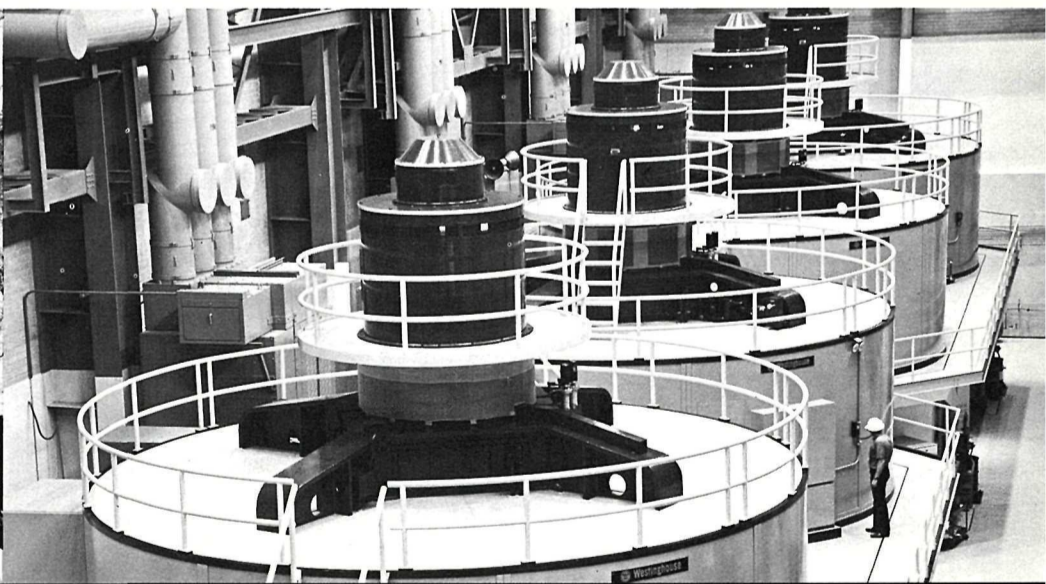
Because a portion of the irrigable land lies on two benches above the river, a 9½-foot tunnel inlet structure, located about 365 feet above the bottom of the dam, runs 250 feet into the canyon wall. When irrigation is developed, the tunnel will be extended for nearly 1½ miles to connect with a pumping plant. Hydraulic turbines powered by water released from the reservoir will drive the pumps which will lift about one-third of the water to higher benchlands. The remainder will flow by gravity through a canal system to irrigate lower benchlands.

Storage and regulation of water provided by Yellowtail is the key to additional irrigation of the lower Bighorn Basin.

Controlled release of floodwaters



Generators, Yellowtail Dam powerplant



Water

Municipal and Industrial Water.

Expanding requirements for all types of energy are focusing attention on the vast coal deposits in the Northern Great Plains. About 40 percent of the Nation's coal resources are located in the area, with huge reserves of mineable coal. This low-sulfur coal is suitable for thermal-electric power generation and for conversion to synthetic pipeline gas or liquid fuels. Water is essential to the conversion to coal, and a substantial volume can probably be made available from Bighorn Lake each year for industrial purposes.

Use of water impounded in Bighorn Lake is subject to terms of the Yellowstone River Compact and provi-

sions of the National Environmental Policy Act of 1969. The magnitude of the Nation's energy needs and the large potential for creating energy-producing systems within the region require orderly development. Close coordination between Federal, State, and local interests will be necessary to balance environmental, social, economic, and energy needs.

Flood Control. Regulation of the erratic and widely fluctuating flows of the Bighorn River to alleviate flood damage is an important function of the Yellowtail Unit. Spring runoff from snowmelt in the mountains and intense storms occasionally cause severe floods. During 1978, storage in Bighorn Lake prevented flood

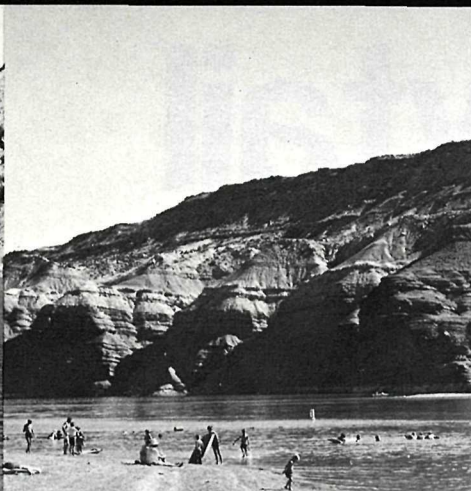


Barry's Landing Recreation Area

damages of more than \$7 million, and by 1979 the reservoir had prevented a total of more than \$17.4 million in flood damages.



Fishing, Bighorn Lake



Swimming, Horseshoe Bend Recreation Area



Ducks and geese feed at Yellowtail Wildlife Area

Recreation

The dam, reservoir, and surrounding area create a playground paradise providing great opportunity for public use and enjoyment and some 63,300 acres in this wonderland have been established as the Bighorn Canyon National Recreation Area, administered by the National Park Service.

A myriad of activities associated with the outdoors is available throughout a rugged and colorful area. The reservoir is a deep 71-mile-long blue-water lake having a magnificent and exciting 195-mile shoreline. Surrounding the reservoir are uplifted mountains—the Bighorns to the east and Pryors to the west—with upland prairie between them. Through this beautiful grassland the Bighorn River has carved a narrow and precipitous gorge, dropping in some cases 2,200 feet from prairie to river level. The lower 47 miles of the lake, which covers portions of Montana and Wyoming, are within the spectacular Bighorn Canyon. A visitor is rewarded with magnificent scenery around every turn of a vari-colored canyon that provides a beautiful backdrop for the reservoir waters. Part of the lake is located in the Crow Indian Reservation, and the area is rich in Indian history. Buffalo jumps, medicine wheels, siege sites, and vision quest locations—all of which have played important parts in the history of the Crow Indian people—are to be seen in several areas of this outdoor playground.

The use of the reservoir and surrounding lands is unusually diversified. Water-related activities constitute the basic attraction, and there are outstanding opportunities for boating trips and cruising parties. Fishing is excellent on the reservoir and in the Afterbay Reservoir. Other activities on the surrounding terrain include camping, picnicking, hiking, riding, scenic drives, visiting points of historical and archaeological interest, the dam itself, bird and wildlife watching, hunting, and geological interests including nearby caves. A visitor center near the dam provides parking areas, rest facilities, a public information center including dioramic exhibits related to the construction of the dam, historical displays, and audiovisual presentations of areas of interest.

Boat-launching ramps, camping and picnicking facilities, comfort stations, and parking areas are available at the Afterbay Dam, Ok-a-beh, Barry's Landing, Horseshoe Bend, and Kane Bridge. A beach, fish-cleaning facility, and a modern winterized comfort station are located at Horseshoe Bend (see map above). For further information on recreational opportunities, contact the Superintendent, Bighorn Canyon National Recreation Area, P.O. Box 458, Fort Smith, Montana, 59035.

Fish and Wildlife

Brown and rainbow trout and walleye pike are the most popular sport fish in Bighorn Lake. Trout predominate in the Afterbay Reservoir and in the Bighorn River for several miles downstream. Big game on nearby land include whitetail and mule deer, antelope, and elk. The Pryor Mountain wild horse range adjoins the area on the west near the Montana-Wyoming border.

Outdoor recreationists will find that Yellowtail provides habitat, food sources, and nesting and resting areas for a large and varied population of upland game birds and waterfowl. Photographers and bird watchers will find a variety of waterfowl, songbirds, and shore birds on the unit, which includes a special wildlife area located along the Shoshone River managed by the Wyoming Game and Fish Commission.

The area has a tremendous potential for waterfowl and upland game-bird hunting and the Wyoming portion is considered the top upland game-bird area in the State. Pheasant, Chukar and Hungarian partridge, sage grouse, sharptail grouse, and wild turkey are available. Waterfowl include Canada geese and mallards.

The Montana portion of the area is surrounded by the Crow Indian Reservation and hunting and fishing on the reservation is limited to members of the Crow Nation; however, you are welcome to enjoy the wildlife and fishery at Yellowtail and in the Bighorn Canyon National Recreation Area.

Physical Data

Dam

Type	Concrete arch
Height above foundation (feet)	525
Crest length (feet)	1,480
Crest width (feet)	22
Crest elevation (feet)	3,660
Base thickness at center of arch (feet)	About 145
Volume (cubic yards)	1,546,000
Spillway: 32-foot-diameter tunnel in left abutment, controlled by two radial gates 25 feet wide by 64.4 feet high. Discharge capacity at water surface elevation 3,660 (cubic feet per second)	92,000

Outlet works:

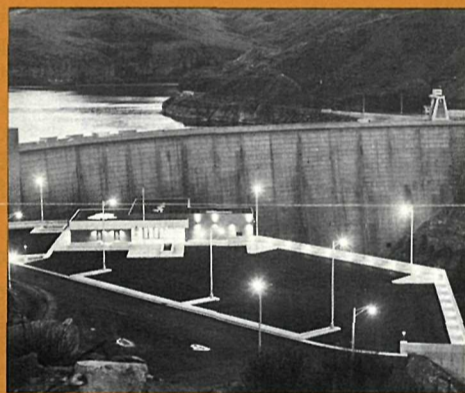
River outlets—Two 84-inch-diameter conduits through dam, controlled by 84-inch-diameter ring-follower gates.
Discharge capacity (cubic feet per second) 5,000
Power outlets - Four 12-foot-diameter penstocks through dam.

Reservoir (Bighorn Lake)

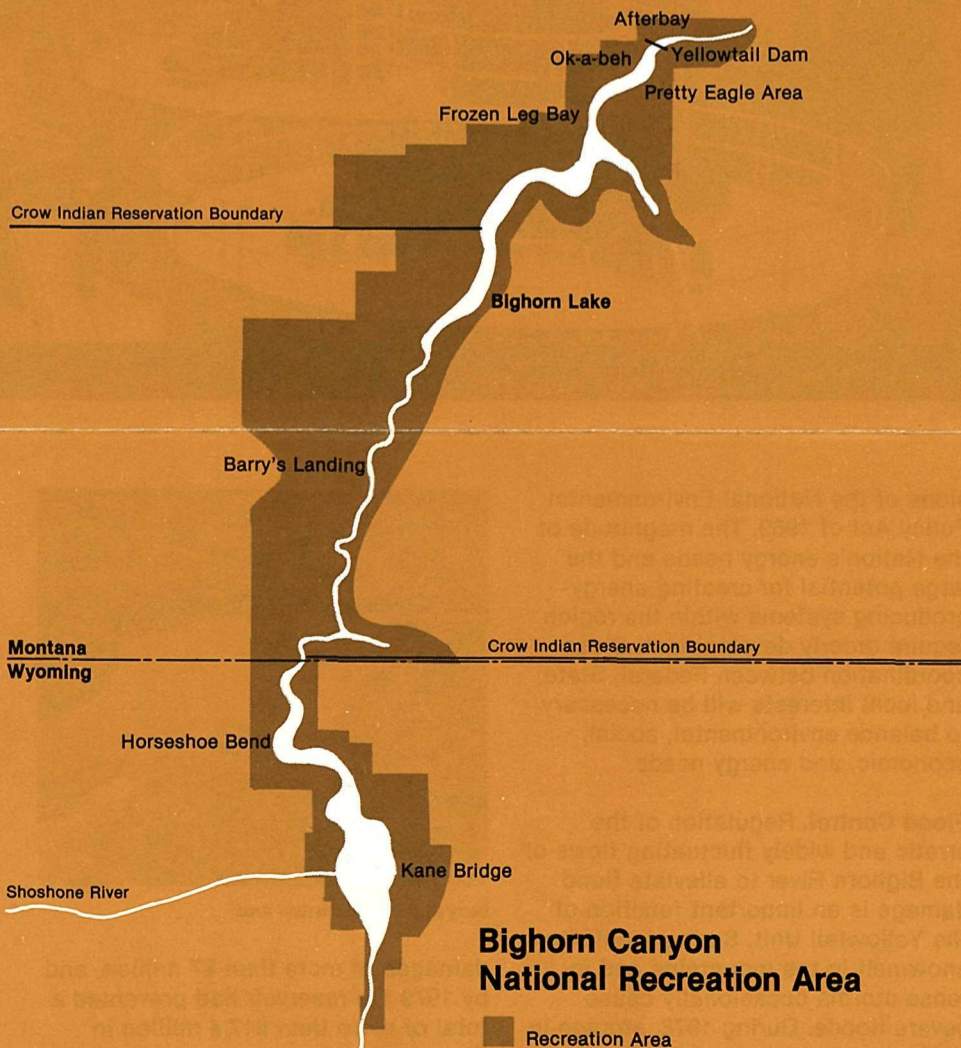
Capacity (acre-feet at elevation 3,657)	1,375,000
Area (acres at elevation 3,657)	17,300
Length (river miles at elevation 3,657)	71
Water surface elevation (joint-use storage)	3,614 to 3,640
Water surface elevation (flood-control storage)	3,640 to 3,657

Powerplant

Indoor-type, housed in structural-steel framework building faced with brick. Vertical-shaft generators direct-connected to Francis-type turbines.	
Total nameplate capacity (kilowatts)	250,000
Number of units	4
Capacity each generator (kilowatts)	62,500
Capacity each turbine (horsepower)	87,500



Visitor Center, Yellowtail Dam



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.