US Army Corps
of Engineers
Portland District

Public Information:

U.S. Army Corps of Engineers,
Portland District
P.O. Box 2946
Portland, OR 97208-2946
Phone: (503) 808-4510

Bonneville Lock and Dam
U.S. Army Corps of Engineers
Cascade Locks, OR 97014-0150
Phone: (541) 374-8820

Bonneville Lock and Dam

A National Historic Landmark Serving the Northwest

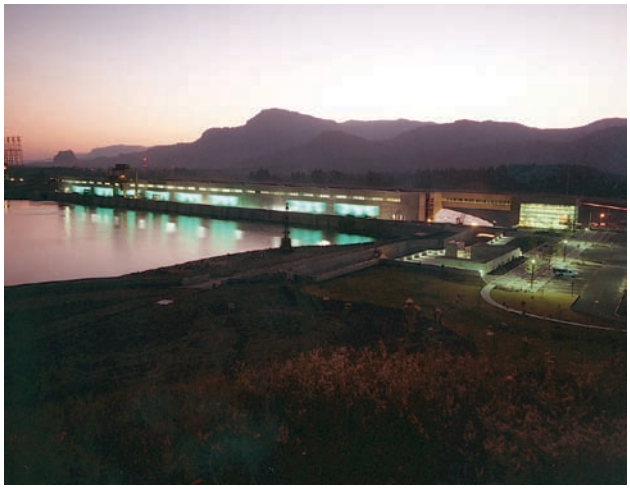
Welcome to Bonneville Lock and Dam

Who, What, Where, and When?

Located in the Columbia River Gorge National Scenic Area 64 kilometers/40 miles east of Portland, Oregon, and Vancouver, Washington, Bonneville Lock and Dam forms a connecting link between the two states. To get to Bonneville, take Interstate 84 from Portland to exit 40, or Washington State Highway 14 from Vancouver to milepost 40. The Bridge of the Gods, about three miles upstream of Bonneville, provides the nearest public route between the Oregon and Washington sides of the lock and dam.

Lake Bonneville, the 77 kilometer/48-mile-long reservoir impounded by the dam, is the first in a series of navigable lakes which are part of the Columbia-Snake Inland Waterway, a water highway running 748 kilometers/465 miles from the Pacific Ocean to Lewiston, Idaho.

Panoramic view of the Columbia River Gorge with Crown Point center right.



Bonneville second powerhouse at night.

Bonneville Lock and Dam, built and operated by the U.S. Army Corps of Engineers, was the first federal locks and dams on the Columbia and Snake rivers. Construction began in 1933 and the lock and dam was dedicated by President Franklin D. Roosevelt on September 28, 1937. Total construction cost was $88.4 million.

As energy needs of the Northwest grew, additional hydropower facilities were built upstream. Although even more electricity could be used in the Northwest, the original Bonneville powerhouse was not large enough to use all the water in the river to generate electricity. A second powerhouse was constructed between 1974 and 1981 on the Washington shore. When the first of the eight new units began producing electricity in 1981, Bonneville Lock and Dam combined the oldest and newest federal powerplants on the Columbia River. The second powerhouse produces 558,000 kilowatts, making Bonneville's total output over one million kilowatts, enough to supply the power needs of nearly 500,000 homes.

It takes more than 150 people to operate and maintain Bonneville Lock and Dam each year. The work force includes engineers, powerhouse and lock operators, office administrators, skilled laborers, warehouse workers, biologists, and park rangers.

About the Corps

The U.S. Army Corps of Engineers is the federal government's largest water resources development and management agency. The Corps' purpose is to provide quality, responsive, cost effective engineering services to support the nation in peace and war. A broad range of professionals--engineers, biologists, natural resource managers, contract specialists, lawyers, real estate specialists, planners, archeologists, and more--make up the Corps' work force.

The Corps' water resources program began in 1824 when the U.S. Congress first appropriated money to improve river navigation. Today's Corps improves ports and river navigation, reduces flood damage, controls beach erosion, generates hydropower, supplies water for irrigation and to cities and industries, regulates development in navigable waters and wetlands, and operates an extensive recreation program.

The Corps' Northwestern Division, headquartered in Portland Oregon, is made up of five Districts: Portland, Seattle, Walla Walla, Kansas City, and Omaha. The Corps constructed, operates and maintains nine dam facilities on the Columbia and Snake rivers: from Bonneville Dam through The Dalles, John Day, and McNary on the lower Columbia, to Chief Joseph on the upper Columbia, and Ice Harbor, Lower Monumental, Little Goose, and Lower Granite, on the Snake.

Dredging is essential to maintaining the Columbia-Snake shipping system. Corps and contract dredges maintain navigation access at coastal ports and along the Columbia and Willamette rivers. This dredging allows deep draft shipping to Portland, Oregon, and, along with locks at the dams, commercial barging as far as Lewiston, Idaho, 748 kilometers/465 miles inland. The power generated at Corps powerplants provides 60 percent of the region's hydropower. Floods are controlled by dams throughout the Northwest. Corps facilities provide for a variety of recreational opportunities at numerous areas.

The Corps, as a major federal player in the Mount St. Helens recovery effort, reopened the Columbia River shipping channel, raised dikes and levees, and dredged tons of sediment to protect towns along rivers. To prevent future flooding, the agency also built and maintains a sediment retention structure that holds back sediment that continues to erode from eruption deposits of ash and mud.

The Corps is a partner with other regional interests as all work to rebuild anadromous (migratory) fish runs in the Northwest. Environmental stewardship is a priority consideration in planning, designing, constructing, operating and maintaining all Corps facilities. Environmental management and restoration of natural and national resources are receiving increased attention throughout the Corps in the Northwest.

National Historic Landmark

Bonneville Lock and Dam was placed on the National Register of Historic Places as an historic district in June 1986.

The historic district covers a 39.26 hectare/97-acre area and consists of seven parts: the administration building, auditorium, spillway dam, powerhouse, navigation lock, the fish hatchery and landscaping. The district also has been designated as a National Historic Landmark.

Bonneville's significance is based on the Colonial-Revival style architecture of the administration building and auditorium, the unique engineering design, the contribution to the region's industrial development, the lock's role in transportation, the entrance landscaping, and the role of Bonneville as a major government undertaking in the 1930s to provide jobs during the Great Depression.

Bonneville Lock and Dam is named for Army Captain Benjamin Bonneville, an early day visionary who led an exploration to the Oregon Country and charted extensive sections of what became the Oregon Trail.

Administration building.

Hydropower For The Northwest

The original powerhouse is located on the Oregon shore.

The second powerhouse and Visitor Orientation Building are on the Washington shore.

Facts and Figures

10-Generator First Powerhouse		
Length	313m	1,027 ft
Total generating capacity	526,700kw	
8-Generator Second Powerhouse		
Length	300.5m	986 ft
Total generating capacity	558,200kw*	
1938 Navigation Lock		
Chamber length	152.4m	500 ft
Chamber width	23.2m	76 ft
Maximum lift	21.3m	70 ft
1993 Navigation Lock		
Chamber length	205.7m	675 ft
Chamber width	26.2m	86 ft
Maximum lift	21.3m	70 ft
Lake Bonneville		
Length	77km	48 mi

*includes two other generators used to attract fish into ladders.

The generator bay at the second powerhouse offers an impressive view of eight working generators.

Hydropower Generation

Water at the upstream side of the dam, moving with tremendous force, is guided down to the turbine blades. As it strikes the blades of the turbine, the water turns the turbine like a propeller. The turning steel turbine spins electromagnets of the rotor. Spinning electromagnets generate electric current in the coils of copper in the stator.

The dams are connected by power transmission lines to supply power to the people and industries of the Northwest and parts of California. Power produced at Bonneville and other Northwest dams is sold by the Bonneville Power Administration, a federal power marketing agency. Revenues from the sale of hydropower repay the U.S. Treasury for the costs of construction and operation of federal power generating facilities.

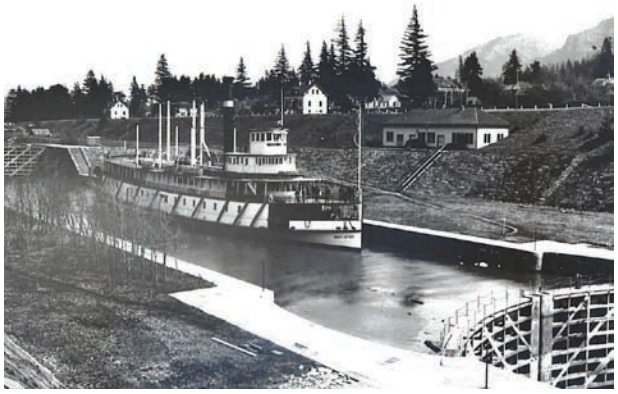
Control room operator carefully monitors the power output of both powerhouses by computer.

Visitors observing a generator through special windows. By going below they can observe the rotating shaft.

Locks Move Products Through The Northwest

The Cascades Lock - 1896

A few miles upstream from the present site of Bonneville Lock and Dam, the first lock on the Columbia River began operating in 1896. Built by the Corps, it allowed ships to move their cargo upriver, eliminating the need to portage goods around the Cascades Rapids. As the reservoir filled after the completion of Bonneville Lock and Dam, the rapids and the Cascades Canal and Lock were submerged. Today, remnants of the old lock can be seen from Cascade Locks Marine Park.



Cascades Canal and Lock, 1896.

Dedication of the original lock, 1938.

Bonneville Lock - 1938

When Bonneville's first lock was completed in 1938, it was the largest single-lift lock in the world, with an 18-meter/60-foot vertical lift. It could hold two barges and a tugboat at one time. As Columbia River traffic increased, new dams were built upriver, with locks capable of holding five-barge tows. Bonneville's lock delayed river traffic since large tows required several separate lockages, greatly increasing shipping time. Now closed to river traffic, it has been replaced by the lock completed in 1993.

Bonneville Lock - 1993

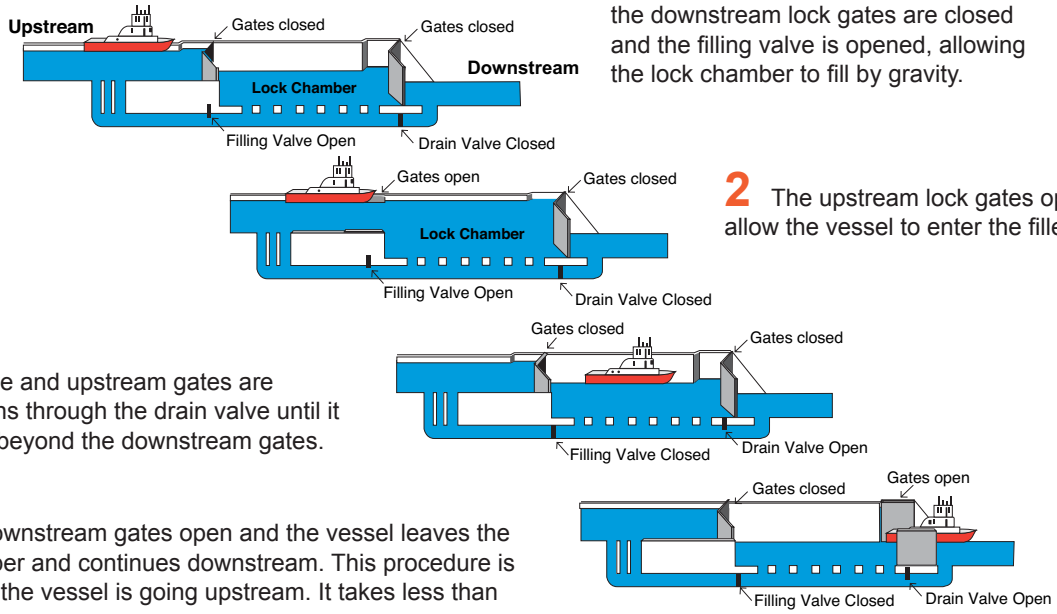
A larger navigation lock at Bonneville opened to traffic in March 1993. The lock is 26 meters/86 feet wide and 206 meters/675 feet long. It can hold five-barge tows which gives it the same capacity as the seven upstream locks. The lockage time has been reduced from several hours to less than 30 minutes. The total construction cost for the lock was $341 million. Commodities such as petroleum products, wood products and grain passing through the Bonneville lock can travel between Lewiston, Idaho, and the Pacific Ocean on the river highway known as the Columbia-Snake Inland Waterway.

The newer lock opened for navigation in March 1993.

How Does A Lock Work?

At Bonneville, the level of water upstream of the dam is usually about 18 meters or 60 feet higher than that of the water downstream. The navigation lock permits vessels to pass from one level to the other. Lockage is available 24 hours a day.

Boaters without radios should look for signs to direct them to pull-cord signals and intercoms located upstream and downstream from the lock. Pull the cord to signal the lock operator. Speak directly to the lock operator over the intercom. Red and green signal lights give visual directions. Radio operators should use Marine Channel 14 in contacting the lock operator for instructions.

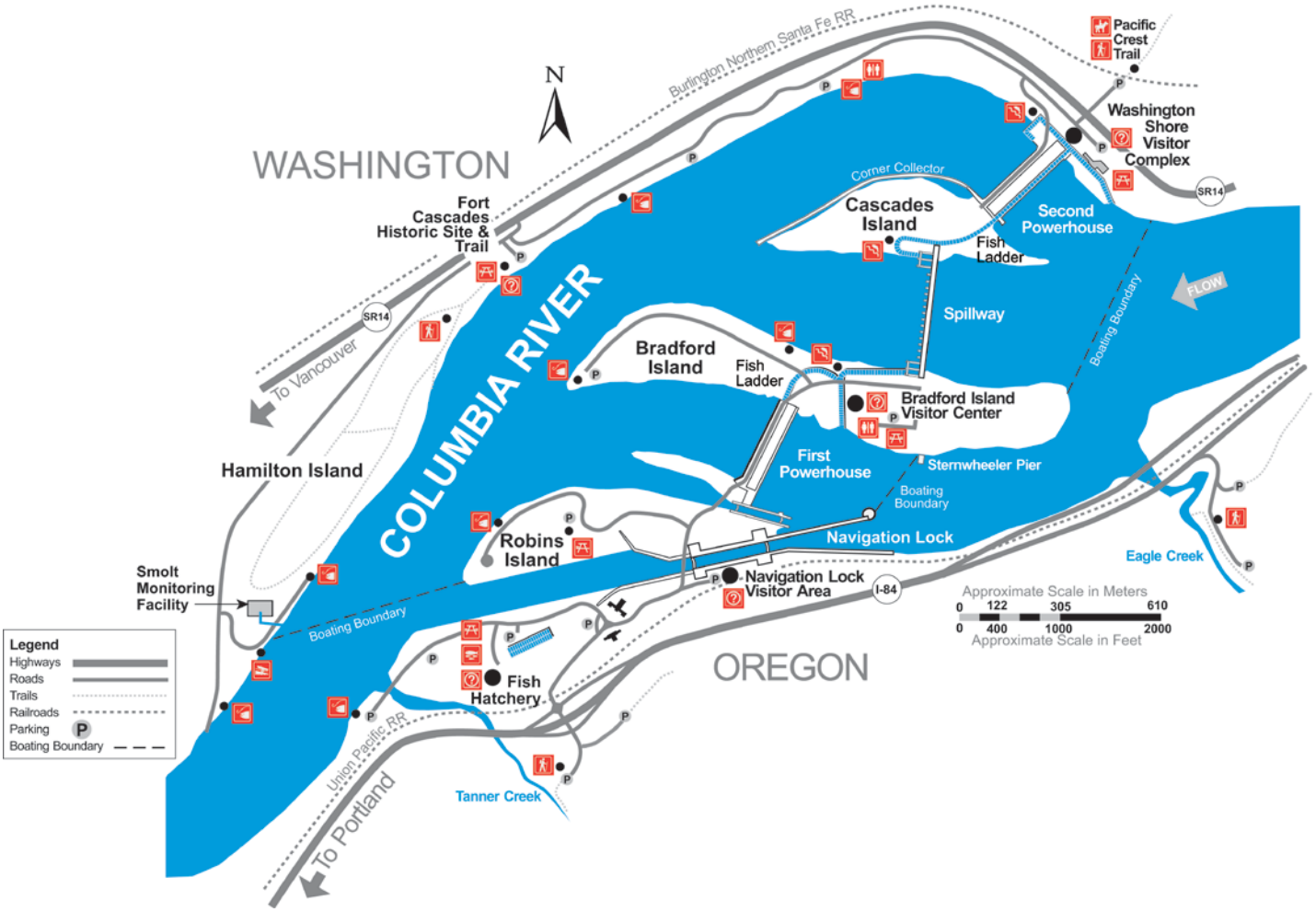


1 With the vessel going downstream, the downstream lock gates are closed and the filling valve is opened, allowing the lock chamber to fill by gravity.

2 The upstream lock gates open and allow the vessel to enter the filled lock.

3 The filling valve and upstream gates are closed. Water drains through the drain valve until it is level with water beyond the downstream gates.

4 The downstream gates open and the vessel leaves the lock chamber and continues downstream. This procedure is reversed if the vessel is going upstream. It takes less than 30 minutes.



Key To Facilities

	information	parking	restrooms	fishing	picnic tables	fish ladders/ counting station	theater
Bradford Island Visitor Center	●	●	●		●	●	●
Washington Shore Visitor Complex	●	●	●		●	●	●
Navigation Lock Visitor Area	●	●	●				
Ft. Cascades Historic Site and Trail	●	●	●	●	●		
Bonneville Fish Hatchery	●	●	●		●		
Fishing Areas		●	●	●			
Boat Ramp		●	●				

Visitor Centers are open daily except Thanksgiving, Christmas and New Year's Day. For further information or to arrange for interpretive programs please call:
(541) 374-8820
TDD: (541) 374-8501
https://www.nwp.usace.army.mil

Bradford Island Visitor Center attracts hundreds of thousands of visitors a year.

The Washington shore visitor complex offers interesting displays, closeup view of generators and fish viewing.

Navigation lock visitor area

Visitor Centers

In addition to enjoying views of migrating fish moving through underwater fishways, visitors at the Bradford Island Visitor Center on the Oregon shore will find a five-level facility with an observation deck, air conditioned interior with exhibits, restrooms, a large theater, and all-glass exterior walls which allow a panoramic view of the Columbia River Gorge. A short walk leads to a viewing area inside the first powerhouse.

From the navigation lock visitor area on the Oregon shore, visitors can watch the navigation lock in operation.

The second powerhouse on the Washington shore offers one of the world's most accessible views of a powerhouse. Inside, generators can be seen from a walkway 26 meters/85 feet above the powerhouse floor. Visitors can ride an escalator down into the powerhouse to get a closeup view of a generator and rotating turbine shaft through special viewing windows.

Inside the fish viewing building and the adjacent visitor orientation building and powerhouse, exhibits explain the history of fish in the area, and the workings of a modern hydropower plant.

Visitor Centers are open daily except Thanksgiving, Christmas and New Year's Day.
For further information or to arrange for interpretive programs please call: (541) 374-8820
TDD: (541) 374-850
https://www.nwp.usace.army.mil

Fort Cascades National Historic Site

Fort Cascades on the Washington shore was officially designated a National Historic Site by the U.S. Department of the Interior in 1987. The 23.88 hectares/59-acre area is a site of significant interest. The 2.4 kilometer/1 1/2-mile hiking trail includes portions of the old portage railroad, a Chinook Indian village which may have been visited by Lewis and Clark, and one of the three military forts near the Cascades Rapids. A brochure available at the visitor center describes the significance of the area.

Fort Cascades National Historic Site

Fish and Wildlife

Federal locks and dams on the Columbia and Snake rivers were designed for balanced use of the region's water resources. Fish ladders planned by Corps engineers, environmental specialists and biologists simulate the waterfalls and pools found in natural streams.

These fishways allow migratory adult fish to continue their migration from the sea upstream to tributaries of the Columbia and Snake rivers.

Bypass facilities at each dam divert oceanbound juvenile fish around the dams. Millions of fingerlings are transported downstream in barges and tanker trucks each year by the Corps' Walla Walla District. The Corps also funds hatcheries which raise millions of fish to help mitigate for the spawning areas lost when lakes filled behind the dams. The Bonneville Fish Hatchery, on Tanner Creek, is one of the oldest hatcheries in Oregon. It was built by the Corps and is operated by the Oregon Department of Fish and Wildlife.

In cooperation with regional agencies and interest groups, Corps engineers and biologists continue research into more effective ways to pass fish around dams. Ever since fish passage facilities were installed at Bonneville Dam in the 1930s, knowledge of fish behavior and requirements has grown. As research has generated new ideas, passage systems have changed. They continue to evolve, and today millions of dollars are being spent to ensure survival of the Northwest's endangered fisheries.

At Bonneville Lock and Dam, the Corps of Engineers also manages 80.94 hectares/200 acres of land as mitigation for waterfowl and non-game species habitat lost to construction of the second powerhouse and the 1993 navigation lock. In addition, 276 hectares/682 acres of land at Steigerwald Lake near Camas, Wash., were purchased to replace wildlife habitat lost during construction of the second powerhouse.

Fish Viewing

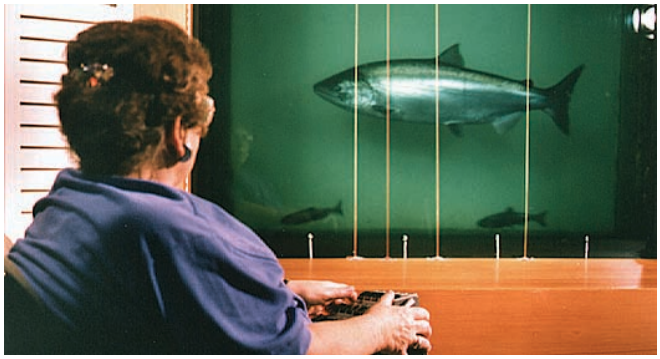
Visitors can watch migrating fish move past underwater windows at the Bradford Island Visitor Center or in the Fish Viewing Building at the Washington shore visitor complex. The underwater lighted windows afford an exciting closeup look at the various fish moving up the fish ladders.

Fish viewing at the Bradford Island Visitors Center.

The best times for fish viewing are:

Steelhead	July and August
Chinook Salmon	April through September
Shad	June
Sockeye	July

Fish Counting



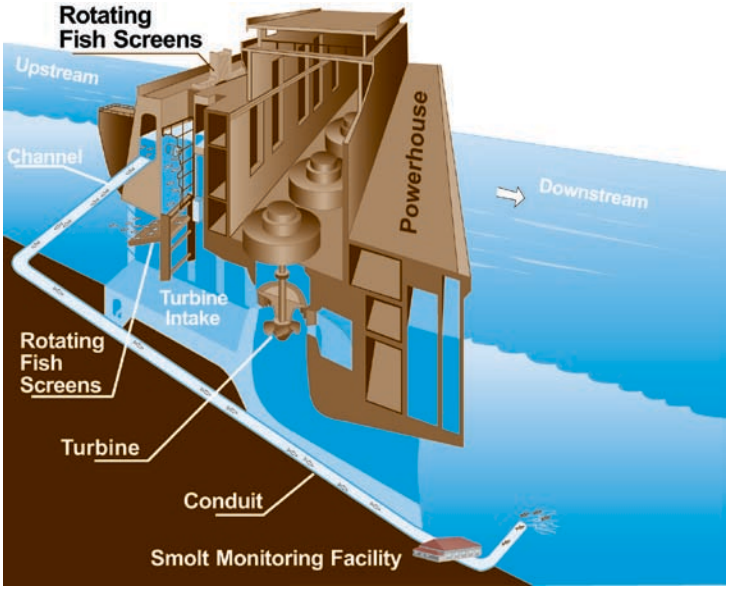
A fish counter.

At each fishway, a worker counts the various species of adult fish moving up the fish ladder. This vital information has been recorded at Bonneville since 1938. It helps biologists and engineers track increases and decreases in fish runs.

Between 700,000 and 1.5 million upstream migrant adult salmon and steelhead, and an estimated 24 to 43 million downstream migrant salmon and steelhead fingerlings, pass Bonneville Dam in an average year. Shad, sturgeon, lamprey and other species also are seen.

Migrating Downstream

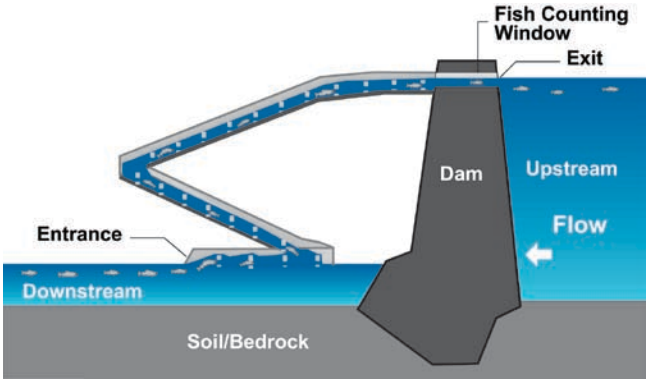
During the spring and summer months, juvenile salmon and steelhead migrate to the ocean where they will grow to adulthood. Many are transported by barge and truck past the dams. Young fish that stay in the river move with water flowing through the spillway or the powerhouse. Rotating fish screens are put in the turbine intakes in the powerhouse to divert the young fish into the bypass system, and away from turbines which can injure them. The bypass system is a channel which carries them safely through the powerhouse. The fish re-enter the river downstream of the dam. Some juveniles are not transported around the dams, do not go through the spillway, and are not diverted by the screens. Those fish go through the turbines.



Moving Up Fish Ladders

Fish ladders on the Oregon and Washington shores extend from the river downstream of the dam to Lake Bonneville upstream. The ladders are passageways for adult fish that seasonally migrate upstream.

Pools in the fish ladders are formed by cross barriers (weirs) that form steps, set in a ramp leading up and around the dam. The weirs have openings along the bottom to allow the fish to swim easily from one stairstep to the next. Chinook, coho and sockeye salmon, steelhead, shad and other fish use the ladders in their upstream migration.



Fish ladder at the Washington shore visitor complex.

To Enjoy A Safe Outing
Observe These Safety Tips

SWIMMING
Use the buddy system. Swim only in posted swimming areas away from docks and boating areas.

UNDERWATER HAZARDS
Submerged stumps, logs and rocks are in the water. Be especially watchful for obstructions near the shoreline.

BOATING
When boating, observe the posted speed at all times. When anchoring downstream of the dam, take extreme precautions as currents can be treacherous. Use an anchor line float and five to seven times as much anchor line as the depth of the river. Wear a personal floatation device. Keep clear of commercial barge traffic. Fatal accidents in this area can be prevented by proper use of these safety guidelines.

SMALL CRAFT WARNINGS
Dangerous waves can build up suddenly. Stay out of open waters when winds become threatening.

FISHING
Stay out of boat channels and swimming areas. While trolling, watch the water ahead for boats, swimmers and underwater obstacles.

WINDSURFING
Never windsurf alone. Wind and wave conditions in the main channel are stronger and rougher than they appear. Sailboards are considered to be vessels and must follow boating rules. Barges in the channel are moving faster than they appear and cannot make sudden turns or stops. Use short reaches to test your equipment and skill. Look before jibing and jumping. Maintain a proper lookout and distance. In case of emergency, contact local authorities. For windsurfing safety tips, write Oregon State Marine Board, P.O. Box 14145, Salem, OR 97309.
marine.board@state.or.us

FIRE PREVENTION
The fire potential is generally high during the recreation season. Fires are not permitted along the shoreline. Dispose of all refuse in trash cans.

Bicycles are permitted as far as Robins Island on the Oregon side of the dam. Pedestrians are permitted as far as the Security Checkpoint on the Oregon side of the dam.

Federal regulations about public use of these areas are in Title 36, Chapters II and III, of the Code of Federal Regulations, and are on display in the areas most frequently used by the public.

Under the Archeological Resources Protection Act of 1979, it is illegal to excavate or remove artifacts from federal land. Violators are subject to a fine of not more than $100,000, imprisonment of not more than five years, and forfeiture of all equipment (including vehicles) used in connection with a violation.