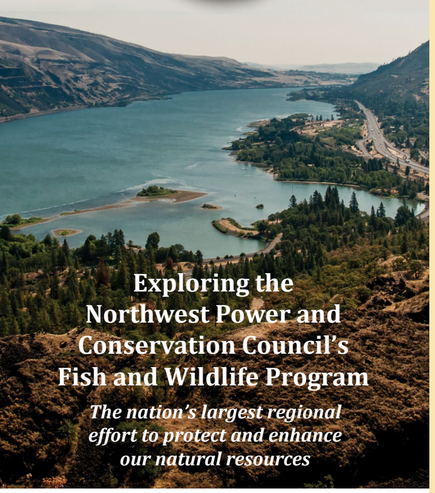
The Columbia River Basin

FIELD GUIDE



Exploring the Northwest Power and Conservation Council's Fish and Wildlife Program

The nation's largest regional effort to protect and enhance our natural resources

Northwest **Power** and **Conservation** Council

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THIS GUIDE highlights some of the projects under way in the Columbia River Basin to mitigate the effects of hydropower dams on fish and wildlife. The projects aim to protect and enhance the fish and wildlife species that are an important part of our Northwest heritage. The projects highlighted in this guide are among hundreds that implement the Columbia River Basin Fish and Wildlife Program of the Northwest Power and Conservation Council. Under federal law, the Bonneville Power Administration, a power marketing agency under the United States Department of Energy, funds projects in the program that are recommended by the Council. Annual funding is around $250 million.

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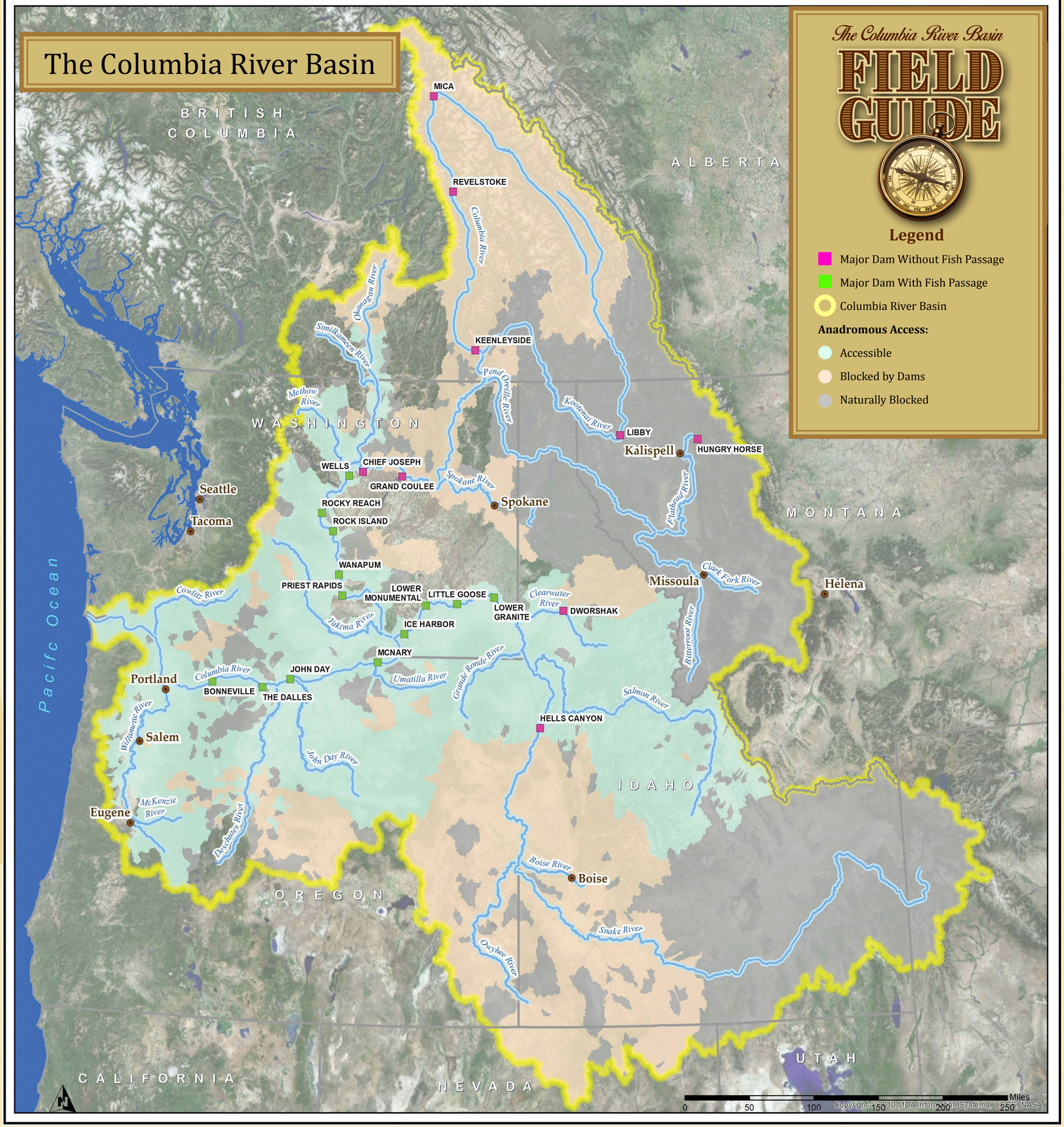

The Columbia River Basin

FIELD GUIDE

Legend

- Major Dam Without Fish Passage
- Major Dam With Fish Passage
- Columbia River Basin

Anadromous Access:

- Accessible
- Blocked by Dams
- Naturally Blocked

Map provided by the Bonneville Power Administration, Geospatial Services. The rivers shown on this map are significant to the Council's fish and wildlife program and have been highlighted for illustrative purposes.

Background

HISTORICALLY, THE COLUMBIA RIVER BASIN supported a rich variety of fish and wildlife, including abundant runs of salmon and steelhead. Millions of salmon and steelhead returned from the ocean each year to spawn in rivers and tributaries throughout the 258,500 square miles of the basin. Returning adult fish spawned as far upriver in the Columbia as the headwaters at Columbia Lake, British Columbia, and migrated up the Snake River, the Columbia's largest tributary, as far as Shoshone Falls, 615 miles from the confluence, and more than 900 miles from the Pacific Ocean.

Wildlife such as deer, elk, moose, bear, song birds, and other species also populated the basin. Over time, the impact of development, recreation, logging, mining, agriculture, navigation, and the generation of hydroelectric power all combined to disrupt the habitat. By the 1990s, the number of returning fish had declined to about one million annually, and many wildlife populations had also been affected.

The Northwest Power Act of 1980 authorized the states of Idaho, Montana, Oregon, and Washington to form the Northwest Power and Conservation Council. The Council gives the states a voice in deciding their energy future, while also protecting and enhancing the fish and wildlife affected by dams on the Columbia and Snake rivers and their tributaries. Through the Council's Columbia River Basin Fish and Wildlife Program, a portion of the money the Bonneville Power Administration earns from selling electricity is dedicated to fish and wildlife projects. It is the largest regional effort to protect and enhance fish and wildlife resources in the nation.

A critical aspect of the project review and selection process is the use of independent scientific review of projects proposed for funding. The Council conducts a thorough review of proposed projects, including examination by an 11-member panel of independent scientists. The panel analyzes proposed projects using the best scientific knowledge available to determine a project's effectiveness, and evaluates the results of prior-year funded projects to measure their success.

The Council, tribes, state and federal fish and wildlife agencies, and the public also participate in the review and selection process. The Council then recommends projects for funding to Bonneville to implement the program. Funding also goes toward examining important scientific and policy issues. For example, the Council appointed a scientific review team of experts in artificial production to provide an independent assessment of the basin's hatchery programs to improve artificial production and better understand the role such practices should play to recover endangered fish.

The program now directs approximately $250 million a year to more than 200 projects throughout the basin using a wide variety of approaches: land acquisition to protect and preserve healthy habitats; research to better understand fish behavior and help rebuild naturally spawning populations; construction, operation, and maintenance of fish hatcheries; improvements to passage systems to assist fish movement through and around dams; restoration efforts to improve spawning and rearing habitats in tributaries; and resident fish programs that mitigate the effects of dams while supporting public fisheries.

Oregon & Washington: White Sturgeon Habitats

WHITE STURGEON, the largest freshwater fish species in North America, is also one of the most unusual: they can live more than 100 years; they aren't considered adults until they are more than 65 inches long, and that can take 25 years; they can grow to weigh well over 1,000 pounds; if their passage isn't blocked, they will swim to the ocean and back periodically; and they can spawn many times in their lives.

While sturgeon inhabit the Columbia for hundreds of miles inland, the construction of dams that span the mainstem Columbia and Snake rivers blocked passage to the ocean. The healthiest population today is the one that lives downstream of Bonneville Dam. These fish freely go back and forth to the ocean and some, marked with tags, have been found in coastal bays from California to British Columbia. Upriver, however, where sturgeon are impounded between dams, the populations are less numerous and reproduction is less successful.

Ever since 1987, the Oregon and Washington departments of fish and wildlife and Columbia River Indian tribes have been collaborating on a research project, funded largely through the Council's fish and wildlife program, to better understand this mysterious species. High flows in the spring once provided a signal to sturgeon that it was time to spawn, but the dams slowed flows through reservoirs, affecting spawning. The most effective way to encourage spawning now may be boosting flows in the spring, a technique that has shown some success for sturgeon in the Kootenai River in northern Idaho downstream from Libby Dam in Montana.

In 2013, Oregon, Washington, and the tribes completed a plan to summarize the current recovery and mitigation efforts and guide future actions throughout the basin. Researchers need data on growth and survival, as well as the proportion of the total population represented by different ages of fish. Recommendations include providing sturgeon passage between reservoirs, and assessing how predation by sea lions, particularly Steller sea lions, affects sturgeon between Bonneville Dam and the ocean.

In the late 1800s and early 1900s, huge quantities of sturgeon were harvested in the lower Columbia River. However, as stocks declined during hydrosystem development, overharvest became such a problem that in order to protect the population, Washington and Oregon imposed size restrictions on harvest beginning in 1950. The stock rebounded, and commercial and sport harvest was allowed. However, in response to emerging sea lion predation and declines in young sturgeon, Oregon and Washington closed white sturgeon commercial and recreational fisheries harvest downstream from Bonneville Dam in January of 2014. Oregon and Washington are assessing this population segment to determine when harvest might resume.

Upstream from Bonneville Dam, limited, but sustainable, tribal and recreational harvests are still allowed in Bonneville, The Dalles, and John Day reservoirs. Led by the Columbia River Inter-Tribal Fish Commission, the tribes are planning to construct a sturgeon hatchery in the Yakima River Basin of Central Washington to raise fish to release into reservoirs where populations are less abundant and less productive than below Bonneville Dam.

Washington: Upper Columbia Spring Chinook Salmon

LIKE MANY OTHER West Coast salmon and steelhead species, upper Columbia spring Chinook salmon, once numerous in Columbia River tributaries of north Central Washington, began a precipitous decline in the mid-20th Century. Steadily, the run dwindled to a fraction of its historic size. Today, a recovery effort is underway, but progress is slow.

There were many causes for the decline: over-fishing — spring Chinook were prized by the canning industry; loss of habitat in freshwater streams and the Columbia River estuary; irrigation water withdrawals from spawning streams; cattle grazing on federal lands that degrades salmon habitat; hydropower development; poor ocean conditions; and hatchery fish that compete with naturally spawning fish. Researchers estimate that the productivity of the species declined by at least 43 percent from the 1950s through the 1980s. By the 1990s, the situation had become dire, and on March 24, 1999 upper Columbia spring Chinook were listed as an endangered species.

The upper Columbia spring Chinook species includes salmon that spawn in Columbia River tributaries above Rock Island Dam and below Chief Joseph Dam, and also fish raised in six hatchery programs. From the 1940s through the 1990s, annual spring Chinook counts at Rock Island averaged 3,200 to 14,400 fish, but in recent years the average has been almost 29,000 fish. This doesn't reflect improvement as much as loss of commercial fishing as a major industry on the lower river. Since the late 1930s, commercial harvest in the lower Columbia has declined by more than 80 percent.

NOAA Fisheries issued a recovery plan for upper Columbia spring Chinook under the Endangered Species Act in October 2007. The recovery work is constantly monitored and can be changed as conditions change. For example, releases from two hatcheries in the Methow River were reduced in order to protect the genetic diversity of the species. The stock being raised and released was a composite of salmon from the Methow and Chewuch rivers, and scientists believed their presence in other upper Columbia tributaries could dilute the unique genetics of fish that spawn naturally in them.

Rebuilding upper Columbia spring Chinook is a complicated exercise as the abundance and productivity of the species continues to be well below goals established in the recovery plan. Protecting and restoring spawning and rearing habitat is a major focus. However, improving environmental quality is a slow process, particularly in a dry climate like north Central Washington. Partners in the spring Chinook rebuilding effort include NOAA Fisheries, the U.S. Fish and Wildilfe Service, the Upper Columbia Salmon Recovery Board, and local electric utilities.

Future work to protect and enhance the species includes improving passage at tributary dams; reducing sediment into spawning and rearing streams; improving conditions in flood plains where juvenile fish rest on their journey to the ocean; and improving computer modeling to better understand the potential for actions like these to contribute to recovering the species.

Idaho: Lake Pend Oreille Kokanee

LAKE PEND OREILLE KOKANEE (landlocked sockeye salmon) are exceedingly popular with anglers, but kokanee are also prey for an introduced species, lake trout. Beginning in the mid-1960s, the kokanee population in Lake Pend Oreille declined precipitously as the result of several factors, including competition with introduced mysid shrimp, changes in kokanee spawning habitat, and predation by lake trout.

Beginning in the late 1990s, the lake trout population grew very rapidly, and predation pushed the kokanee population to critically low levels that forced the closure of the fishery in 2000. Suppressing the lake trout population became a focus of the Lake Pend Oreille Fishery Recovery Project of the Idaho Department of Fish and Game at that time.

Starting in 2006, the project contracted a commercial fishing business to remove lake trout using gill nets and trap nets. An incentive program was also initiated to encourage anglers to harvest the fish. Using acoustic telemetry, biologists identified spawning and nursery areas where netting would be most effective. The recovery program evaluates the broader effectiveness of removal by monitoring the population decline, as well as the response of desirable fish like kokanee, bull trout, and rainbow trout.

The netting and angler bounty programs have been highly effective, removing nearly 200,000 lake trout and resulting in the collapse of the population. As hoped, the rest of the Lake Pend Oreille fishery has responded favorably. Adult kokanee abundance, which reached an all-time low in 2007 with approximately 10,000 fish, rebounded to over 1 million adults in 2013 and 2014. The bull trout population is stable or increasing, and estimated rainbow trout growth has improved to 1970s and 1980s levels. The kokanee fishery that was closed from 2000-2012 has rebounded.

While the recovery of the Lake Pend Oreille fishery has been impressive, the recovery program will continue to address problems that threaten the long-term sustainability of the fishery. This includes identifying the level of netting required to suppress lake trout and evaluating other factors that limit the kokanee population. Research suggests that spawning habitat is adequate, so understanding how mysid shrimp and predation by rainbow trout affect them will be top priorities. The program will also evaluate the most effective hatchery programs to eventually sustain an annual harvest of 300,000 kokanee, enhance the bull trout and westslope cutthroat trout populations, and maintain a trophy fishery for rainbow trout.

Montana: Hungry Horse Mitigation

SINCE 1991, Montana Fish, Wildlife & Parks (MFWP) and the Confederated Salish and Kootenai Tribes (CSKT) have maintained a crucial partnership to understand and mitigate ecological harm caused by the construction, impoundment, and operation of Hungry Horse Dam. The mitigation program's goals are to restore and reconnect critical habitat, reduce the negative interactions between native and non-native fish, and improve dam operations for native trout recovery.

The Flathead River system in Northwestern Montana is a regional stronghold for native resident fish species such as westslope cutthroat trout and threatened bull trout. Construction of the dam completely blocked fish migration from Flathead Lake to the South Fork Flathead River, disconnecting about 40 percent of the historic spawning habitat from the interconnected Flathead system. In addition, road culverts around Hungry Horse Reservoir impeded fish access to numerous reservoir tributaries. To improve fish passage to these critical spawning and rearing habitats, the program completed several culvert replacement and channel restoration projects reconnecting 16 percent of tributary habitat and increasing trout in these streams. Elsewhere in the Flathead Subbasin, land acquisition and conservation easements are used to permanently protect important riparian habitats at risk of development. Cost-share partnerships have expanded ecological benefits of this important conservation strategy.

Bull trout are the salmon of Montana, and like salmon, bull trout are protected under the Endangered Species Act. Unlike salmon, their range extends across the Columbia River Basin. CSKT and MFWP are working on several fronts to address the limiting factors controlling native fish abundance, such as reducing predation by nonnative lake trout in Flathead Lake and by removing rainbow trout in westslope cutthroat trout strongholds. Efforts are underway to identify opportunities to secure genetic reserves and cold water refugia for both bull trout and westslope cutthroat trout. Hatchery facilities at Sekokini Springs and Creston play an important role in recovery and conservation of these native species.

Dam operations also created unnatural flow and temperature fluctuations in the Flathead River downstream of Hungry Horse Dam, disrupting aquatic insect production and creating favorable conditions for nonnative lake trout. In 1996, a temperature control structure was installed on the dam to allow operators to take water from the appropriate depth in the reservoir to more closely match the natural, seasonal temperature pattern in the river. As a result, more normal temperatures have been restored in the Flathead River downstream of the dam and monitoring efforts are underway to document the benefits to native fish. In recent years, operations like variable flow releases from the dam and dam operations incorporated in the Council's fish and wildlife program have also helped stabilize river fluctuations and reservoir levels to increase native species in the system.

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