Northwest Salmon & Steelhead Recovery Planning & Implementation

Upper Columbia Recovery Domain

Listed Species:
Upper Columbia Steelhead
Upper Columbia Spring Chinook

Management Unit:
Upper Columbia

Partner:

Upper Columbia Salmon Recovery Plan Summary

This recovery plan was a joint project developed by the Upper Columbia Salmon Recovery Board (UCSRB) and the National Marine Fisheries Service (NMFS). The UCSRB comprises representatives from Chelan, Douglas, and Okanogan counties, the Colville Confederated Tribes, and the Yakama Nation. The UCSRB's mission is to restore viable and sustainable populations of salmon, steelhead and other at-risk species through collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region. This plan is an outgrowth and culmination of several conservation efforts in the Upper Columbia Basin, including current efforts related to the Endangered Species Act (ESA), state- and tribe-sponsored recovery efforts, subbasin planning, and watershed planning.

Upper Columbia spring Chinook and Upper Columbia steelhead are both listed as *endangered* under the ESA. The plan focuses on three Upper Columbia spring Chinook populations (Wenatchee, Entiat, and Methow populations) and four Upper Columbia steelhead populations (Wenatchee, Entiat, Methow, and Okanogan populations). A fifth population of steelhead, Crab Creek is not addressed due to uncertainty regarding its potential contribution to recovery.

It is important to note that although bull trout are listed under the ESA and included in the Upper Columbia Recovery Plan, they are under the jurisdiction of the U.S. Fish and Wildlife Service and are not accounted for in this summary. The recovery actions targeting salmon and steelhead populations are, however, expected to benefit listed bull trout as well.

Recovery actions for Chinook and steelhead populations in the Upper Columbia Basin are addressed for each sector (Harvest, Hatchery, Hydro, and Habitat). Some of the recovery actions recommended in this plan were developed in other forums or processes (e.g., Public Utility District Habitat Conservation Plans) and are incorporated with little or no modification. Several, however, have already been implemented to the benefit of one or more of the viable salmonid population parameters (abundance, productivity, spatial structure, and diversity). Identified in this plan are 306 recovery actions to be implemented within the Upper Columbia Basin.

The following summarizes, from the plan, the limiting factors, recovery actions and strategies, as well as the entities committed to implementation and, ultimately, recovery. It is the intent of this plan that collaboration and cooperation will become the foundation from which Upper Columbia Chinook and steelhead will once again become thriving members of their own ecosystems.

Upper Columbia Steelhead & Spring Chinook Salmon

Spring Chinook Distribution & Life History

Spring Chinook begin returning from the ocean to the Columbia River in early spring. They enter the Upper Columbia tributaries from April through July. Spawning occurs in late summer, peaking in mid to late August. Juvenile spring Chinook spend a year in freshwater and migrate to the ocean in the spring of their second year. Most Upper Columbia spring Chinook return as adults after two or three years in the ocean. Males, or jacks, return after one winter at sea. The run is dominated by four- and five-year-old fish that have spent two and three years at sea, respectively. Fecundity ranges from 4,200 to 5,900 eggs, depending on the age and size of the female.

Steelhead Distribution & Life History

The life-history pattern of steelhead in the Upper Columbia basin is complex. Adults return to the Columbia River in the late summer and early fall. Unlike spring Chinook, most steelhead do not move upstream quickly to tributary spawning streams. A portion of the returning run overwinters in the mainstem reservoirs, passing over the Upper Columbia River dams in April and May of the following year. Spawning occurs in late spring of the calendar year following entry into the river. Currently, and for over 20 years, most spawning steelhead in the Upper Columbia are hatchery fish. The effectiveness or fitness of hatchery fish spawning in the wild is low compared to naturally produced spawners; and interbreeding between healthy and natural fish may be a major factor in reducing natural steelhead productivity.

Juvenile steelhead generally spend one to three years rearing in freshwater before migrating to the ocean. Most adult steelhead return to the Upper Columbia after one or two years at sea. Steelhead in the Upper Columbia have a relatively high fecundity, averaging between 5,300 and 6,000 eggs.

Steelhead, which are migratory, and rainbow trout, which remain in freshwater, are members of the same biological species, *Oncorhynchus mykiss*. However, NMFS concluded, as part of its decision to list the steelhead as endangered, that "despite the apparent reproductive exchange between resident and anadromous *O. mykiss*, the two life forms remain 'markedly separated' as a consequence of physical, physiological, ecological, and behavioral factors. Steelhead differ from resident rainbow trout physically in adult size and fecundity, physiologically by undergoing smoltification, ecologically in their preferred prey and principal predators, and behaviorally in their migratory strategy" (71 FR 838). The collective contribution of the resident life history form to the persistence of steelhead is unknown, and may not substantially reduce the overall extinction risk of the steelhead DPS (71 FR 834). This recovery plan addresses steelhead and not rainbow trout, as is consistent with the 2006 ESA listing decision.

Current Status

The status of a salmonid population is expressed in terms of four parameters: abundance, productivity, spatial structure, and diversity. These are called the viable salmonid population or VSP parameters. Viability is further defined in terms of risk of extinction within 100 years.

By these criteria, Upper Columbia spring Chinook populations currently are not viable. Based on abundance and productivity, the three extant populations (Wenatchee, Entiat & Methow) are at high risk and have a greater than 25 percent risk of extinction over a 100-year timeframe. Taking spatial structure and diversity into consideration, the overall risk of extinction is high. One Upper Columbia spring Chinook population, the Okanogan, is extinct. However, the Colville Tribe is working to reintroduce Chinook into this subbasin.

The five populations of Columbia River steelhead (Wenatchee, Entiat, Methow, Okanogan, and Crab Creek) currently are not viable. Based on abundance and productivity, these populations are at high risk and have a greater than 25 percent risk of extinction. When spatial structure and diversity are also considered, three populations are at moderate to high risk, while the Okanogan population is at high risk. The plan does not address recovery of the Crab Creek population. In addition to key uncertainties concerning the population, participation in the planning process by appropriate entities and stakeholders was initiated too late for Crab Creek to be included.

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Limiting Factors & Threats

The following are the limiting factors (biological and physical conditions that limit a species' survival) and threats (activities or processes that cause the limiting factors) identified for the ESA-listed fish in the Upper Columbia basin. These are organized according to the five categories set forth in Section 4(a)(1) of the ESA.

The present or threatened destruction, modification, or curtailment of its habitat or range	▪ Although land and water management activities have improved, factors such as dams, water diversions, roads and railways, some aspects of agriculture (including livestock grazing) residential development, and some historic forest management continue to threaten spring Chinook and steelhead as well as their habitat in some locations in the Upper Columbia basin. ▪ Water diversions without proper passage routes disrupt migrations of spring Chinook and steelhead. ▪ Unscreened diversions trap or divert juvenile spring Chinook and steelhead resulting in reduced survival. ▪ Hydroelectric passage mortality reduces abundance of migrant spring Chinook and steelhead. ▪ Sedimentation from land and water management activities is a cause of habitat degradation in some salmon and trout streams. ▪ Loss of habitat complexity, off-channel habitat, and large, deep pools due to sedimentation and loss of pool-forming structures such as boulders and large woody debris, reduce survival of listed fish species and threatens their habitat in some locations in the Upper Columbia Basin.
Overutilization for commercial, recreational, scientific, or educational purposes	▪ The effects of incidental mortality on naturally produced spring Chinook and steelhead may increase during recreational fishing for hatchery fish or other species. ▪ Incidental harvest mortality in mixed-stock and commercial fisheries contributes to the loss of naturally produced spring Chinook and steelhead. ▪ Illegal harvest (poaching) continues to threaten listed fish species.
Disease or predation	▪ The presence of non-native species has resulted in increased predator populations that prey on listed fish species and/or compete with listed fish. ▪ Increased predation by northern pikeminnow affects the survival of downstream migrating spring Chinook and steelhead. ▪ Predation by pinnipeds (marine mammals) and birds are also a threat to spring Chinook and steelhead.
Inadequacy of existing regulatory mechanisms	▪ The implementation and enforcement of existing Federal and state laws designed to conserve fishery resources, maintain water quality, and protect aquatic habitat have not been entirely successful in preventing past and ongoing habitat degradation. ▪ Although the Washington State Growth Management Act and Shoreline Management Act have been significantly changed to improve management, conditions and protection efforts for listed species and compliance monitoring (enforcement) have lagged behind because of a lack of political support and funding. ▪ The extent and distribution of Federal lands limits the ability of the Northwest Forest Plan and PACFISH/INFISH to achieve its aquatic habitat restoration objectives at watershed and river basin scales.

	▪ The "base" State of Washington Forest Practice Rules does not adequately address large woody debris recruitment, tree retention to maintain stream bank integrity and channel networks within floodplains, and chronic and episodic inputs of coarse and fine sediment that maintain habitat that are properly functioning for all life stages of listed fish species. ▪ The Federal Clean Water Act has not been completely implemented and therefore has not been completely successful in protecting listed fish species, particularly with respect to non point sources of pollution.
Other natural or human-made factors affecting its continued existence	▪ Natural conditions (e.g., fires, floods, droughts, landslides, etc.) can exacerbate the problems associated with degraded and altered aquatic habitats. ▪ Drought conditions reduce already limited spawning, rearing, and migration habitat. ▪ Poor ocean conditions (e.g., less upwelling, warm surface waters, etc.) negatively affect spring Chinook and steelhead production. ▪ The use of non-locally derived broodstock for hatchery programs may negatively affect genetic integrity. ▪ The collection of naturally produced spring Chinook and steelhead for hatchery broodstock may harm small or dwindling natural populations if not done with caution. ▪ Competition, genetic introgression, and disease transmission resulting from hatchery introductions may reduce the productivity and survival of naturally produced spring Chinook and steelhead.

Recovery Goals

To secure long-term persistence of viable populations of naturally produced spring Chinook and steelhead distributed across their native range.

Recovery Objectives

Increase the abundance of naturally produced spring Chinook and steelhead spawners within each population in the Upper Columbia ESU and DPS to levels considered viable. Increase the productivity (spawner:spawner ratios and smolts/redds) of naturally produced spring Chinook and steelhead within each population to levels that result in low risk of extinction. Restore the distribution of naturally produced spring Chinook and steelhead to previously occupied areas where practical and allow natural patterns of genetic and phenotypic diversity to be expressed.

Spring Chinook Recovery Criteria for Abundance & Productivity

Criterion 1: The 12-year geometric mean for abundance and productivity of naturally produced spring Chinook within the Wenatchee, Entiat, and Methow populations must reach a level that would have not less than a 5% extinction-risk (viability) over a 100-year period.

Criterion 2: At a minimum, the Upper Columbia Spring Chinook ESU will maintain at least 4,500 naturally produced spawners and a spawner:spawner ratio greater than 1.0 distributed among the three populations.

Steelhead Recovery Criteria for Abundance & Productivity

Criterion 1: The 12-year geometric mean for abundance and productivity of naturally produced steelhead within the Wenatchee, Entiat, Methow, and Okanogan populations must reach a level that would have not less than a 5% extinction-risk (viability) over a 100-year period.

Criterion 2: At a minimum, the Upper Columbia steelhead DPS will maintain at least 3,000 spawners and a spawner:spawner ratio greater than 1.0 distributed among the four populations.

Recovery Strategies & Actions

The results of preliminary analysis indicate that the implementation of recommended actions in this plan will move the listed species toward recovery. The following recovery strategies fall into the 4-Hs and are categorized by short and long-term objectives.

	Short-Term Objectives	Long-Term Objectives
Harvest	▪ Use selective harvest techniques to constrain harvest on naturally produced fish at the currently reduced rates in the Upper Columbia basin. ▪ Use selective harvest techniques to preserve fishery opportunities in the Upper Columbia basin that focus on hatchery produced fish that are not needed for recovery. ▪ Recommend that parties of *U.S. v. Oregon* incorporate Upper Columbia viable salmonid population criteria when formulating fishery plans affecting Upper Columbia spring Chinook and steelhead. ▪ Increase effective enforcement of fishery rules and regulations. ▪ Appropriate co-managers/fisheries management agencies should work with local stakeholders to develop tributary fisheries management goals and plans.	▪ Provide opportunities for increased tributary harvest consistent with recovery. ▪ Incorporate Upper Columbia viable salmonid population criteria when formulating fishery plans affecting Upper Columbia spring Chinook and steelhead.
Hatcheries	▪ Continue to use artificial production to maintain critically depressed populations in a manner that is consistent with recovery and avoids extinction. ▪ Use artificial production to seed unused, accessible habitats. ▪ Use artificial production to provide for tribal and non-tribal fishery obligations as consistent with recovery criteria. ▪ Use harvest or other methods to reduce the proportion of hatchery-produced fish in naturally spawning populations. ▪ To the extent possible use local broodstocks in hatchery programs. ▪ To the extent possible, integrate federal, state, and tribal-operated hatchery programs that use locally derived stocks ▪ Reduce the amount of in-basin straying from current hatchery programs	▪ Phase out the use of out-of-basin stock in the federal programs at Leavenworth and Entiat National Fish Hatcheries if continued research indicates that the programs threaten recovery of listed fish and those threats cannot be minimized through operational or other changes. ▪ Strive to make ongoing hatchery programs consistent with recovery. ▪ Provide for tribal and non-tribal fishery obligations. ▪ Use harvest or other methods to reduce the proportion of hatchery produced fish in naturally spawning populations. ▪ Manage hatcheries to achieve sufficient natural productivity and diversity to de-list populations and to avert re-listing of populations.

	Short-Term Objectives	Long-Term Objectives
Habitat	▪ Protect existing areas where high ecological integrity and natural ecosystem processes persist. ▪ Restore connectivity (access) throughout the historic range where feasible and practical for each listed species. ▪ Where appropriate, establish, restore, and protect stream flows (within the natural hydrologic regime and existing water rights) suitable for spawning, rearing, and migration (based on current research and modeling). ▪ Protect and restore water quality where feasible and practical within natural constraints. ▪ Increase habitat diversity in the short term by adding instream structures (e.g., large woody debris, rocks, etc.) where appropriate. ▪ Protect and restore riparian habitat along spawning and rearing streams and identify long term opportunities for riparian habitat enhancement. ▪ Protect and restore floodplain function and reconnection, off-channel habitat, and channel migration processes where appropriate and identify long-term opportunities for enhancing these conditions. ▪ Restore natural sediment delivery processes by improving road network, restoring natural floodplain connectivity, riparian health, natural bank erosion, and wood recruitment. ▪ Replace nutrients in tributaries that formerly were provided by salmon returning from the sea. ▪ Reduce the abundance and distribution of non-native species that compete and interbreed with or prey on listed species in spawning, rearing, and migration areas.	▪ Protect areas with high ecological integrity and natural ecosystem processes. ▪ Maintain connectivity through the range of the listed species where feasible and practical. ▪ Maintain suitable stream flows (within natural hydrologic regimes and existing water rights) for spawning, rearing, and migration. ▪ Protect and restore water quality where feasible and practical within natural constraints. ▪ Protect and restore off-channel and riparian habitat. ▪ Increase habitat diversity by rebuilding, maintaining, and adding instream structures (e.g., large woody debris, rocks, etc.) where long-term channel form and function efforts are not feasible. ▪ Reduce sediment recruitment where feasible and practical within natural constraints. ▪ Reduce the abundance and distribution of non-native species that compete and interbreed with or prey on listed species in spawning, rearing, and migration areas.

Upper Columbia Steelhead & Spring Chinook Salmon

	Short-Term Objectives	Long-Term Objectives
Hydro	▪ Implement actions in the 2008 Federal Columbia River Power System ESA Biological Opinion to improve salmon and steelhead survival. ▪ Continue the actions identified in the Anadromous Fish Agreement and HCPs that will achieve no net impact for Upper Columbia steelhead and spring Chinook. ▪ Implement the actions identified in the Settlement Agreement and Section 7 Consultation with Grant PUD that will improve spring Chinook and steelhead survival. ▪ Implement the actions identified in the Lake Chelan Hydroelectric Project relicensing agreement that will provide suitable spawning habitat for steelhead in the tailrace and lower Chelan River (downstream from the natural fish barriers).	▪ Provide upstream and downstream passage for juvenile/smolt and adult life stages. ▪ Achieve no-net-impact on species covered under the Anadromous Fish Agreement, HCPs, and Section 7 Consultations. ▪ Maintain suitable spawning habitat for steelhead in the lower Chelan River and tailrace.

Time & Cost

The estimated cost of restoring habitat for spring Chinook and steelhead in the Upper Columbia basin is at least $296 million over the first 10-year period. This estimate includes expenditures by local, Tribal, state, and Federal governments and private business and individuals in implementing both capital projects and non-capital work. Although these costs are attributed to spring Chinook and steelhead conservation, other species will also benefit. Although it is not practicable to accurately estimate the total cost of recovery, it appears that most of the costs will occur in the first 10 years. Annual costs are expected to be lower for the remaining years, thus the total for the entire period (years 11-30) may possibly range from $150 million to $200 million.

The time necessary to achieve reclassification for spring Chinook and steelhead and recovery of spring Chinook and steelhead in the Upper Columbia basin depends on the status of the fish species, factors affecting their viability, implementation and effectiveness of recovery actions, and responses to recovery actions. A large amount of work within all sectors is needed to recover the species. If the actions recommended in this plan are implemented, recovery of the three listed species should occur within 10 to 30 years.

It is uncertain exactly how recovery will be funded in the Upper Columbia basin. Habitat Conservation Plans and binding mitigation agreements help guarantee that some programs (e.g., state-run mitigation hatchery programs, tributary habitat fund, etc.) have secure funding and will continue operating into the future. However, these programs fall short of funding the total needs of this plan. Additional funding from the following sources will be required to implement this recovery plan.

- The Washington Salmon Recovery Funding Board.
- Public Utility District funds.
- The Bonneville Power Administration (BPA) Fish and Wildlife Program.
- The Federal Columbia River Power System Biological Opinion.
- Appropriations from the Washington State Legislature for state agency budgets (WDFW, 39 WDOE, Conservation Districts).
- Pacific Coast Salmon Recovery Fund (NMFS).
- Appropriations from the U.S. Congress for federal agency (USACE, USFWS, USGS, USFS, NRCS, BOR, and BLM).
- Local government mechanisms funded through state legislative appropriations.
- Other nongovernmental organizations such as the National Fish and Wildlife Foundation, Regional Fishery Enhancement Groups, the Bonneville Environmental Foundation, and the Bullitt Foundation.
- Voluntary projects funded through public and private partnerships.

Because of limited resources, recommended actions will be funded according to a prioritization framework that is based on a balance between biological benefit of the action, and the cost and feasibility of implementing the action. Projects that address primary limiting factors, have high biological benefit, are relatively inexpensive, and are feasible to implement will receive the highest funding priority.

Implementation

The UCSRB is the coordinating body for the plan and it is their responsibility to make sure the plan is implemented in a voluntary manner. An Implementation Team, composed of a leader, three lead entity representatives (one from each county), the Upper Columbia Regional Technical Team, local, state, Federal, and Tribal resource management agencies and others including local stakeholders, will be responsible for implementing the plan, tracking progress, identifying milestones and benchmarks, and sequencing tasks. As part of implementing the plan, a detailed monitoring and evaluation program will be designed and incorporated into an adaptive management framework.

The Implementation Team will be involved in all issues related to recovery actions, and will coordinate with the UCSRB, *U.S. v Oregon*, Habitat Conservation Plans for the Public Utility Districts, Biological Opinion and Anadromous Fish Agreement, Section 7 consultations, the Mitchell Act, Hatchery and Genetic Management Plans, and federal trust responsibilities to the tribes. The Implementation Team will work closely with local Watershed Action Teams, which will be responsible for identifying specific habitat restoration actions and coordinating activities within their respective subbasins. All proposed recovery actions will be coordinated with local stakeholder input and local stakeholders will be included in the development of any of the planning processes that may affect their interests.

For more information

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