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Managing Water in the West

Anadromous Fish Reintroduction Plan Storage Dam Fish Passage Study Yakima Project, Washington

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U.S. Department of the Interior
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U.S. Department of the Interior

Mission Statement

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

U.S. Bureau of Reclamation

Mission Statement

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.

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Storage Dam Fish Passage Study
Yakima Project, Washington

Anadromous Fish Reintroduction Plan

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ANADROMOUS FISH REINTRODUCTION PLAN

Introduction

This document contains a suggested sequence and methodology for reintroduction of anadromous fish species above selected Bureau of Reclamation (Reclamation) Yakima Project (YP) storage dams. This plan is based on extensive discussions between the fisheries co-managers, Yakama Nation Fishery Resource Management (YN) and Washington Department of Fish and Wildlife (WDFW).

The anadromous fish species being considered for reintroduction above the storage dams in order of preference include sockeye salmon (Onchorynchus nerka), coho salmon (O. kisutch), spring chinook salmon (O. tshawytscha), summer steelhead (O. mykiss), and Pacific lamprey (Lampetra tridentata). An additional objective is to provide two-way passage for resident bull trout to restore genetic connectivity between landlocked adfluvial populations in the storage reservoirs and fluvial (riverine) bull trout that reside downstream of the dams. Bull trout and steelhead are listed as "threatened" under the Endangered Species Act.

During Phase 1 of this assessment, the inter-agency work group and Reclamation selected two dams for detailed feasibility/engineering study leading to the construction of interim (temporary) juvenile (downstream) and adult (upstream) fish passage facilities. The two selected projects are Cle Elum Dam (Cle Elum River, Kittitas Co.) and Bumping Dam (Bumping River, Yakima Co.). Other YP storage dams may be considered for future fish passage facility construction based on the success of the interim passage facilities and the fish reintroduction plan at these two projects. This proposed reintroduction plan currently addresses only the Cle Elum Dam juvenile fish passage project.

Considering the significant costs involved in planning, engineering, construction, operation, and maintenance of even temporary fish passage facilities at this project, waiting for existing fish populations downstream of the dams to colonize or "pioneer" newly accessible upstream habitat is unacceptable to the fisheries co-managers and Reclamation. It could take three or four salmon generations (15-20 years) or more to realize significant use of habitat above the reservoirs if fish reintroduction, especially for sockeye salmon, is not aided by human intervention.

The YN and WDFW have developed a re-introduction plan based on using species available in the near-term, mid-term, or long-term. Near-term efforts will utilize hatchery coho salmon smolts that are readily and reliably available as early as 2005 for testing the efficacy of modified interim juvenile and adult passage facilities. The primary benefit to re-establishing anadromous salmonid passage upstream of Yakima Project storage dams

will be the re-introduction of the sockeye salmon, which utilize the lake environment for juvenile rearing. Sockeye salmon reintroduction is considered to be a "mid-term" effort because there are only two potential donor stocks in the upper Columbia Basin, even though it's the preferred species and coho salmon will serve as surrogates to evaluate the interim passage facilities. Both of these stocks are wild or naturally produced populations that exhibit highly variable abundance from year-to-year. The co-managers must be satisfied that the passage facilities are functional and efficient before attempting re-introduction with these valuable native sockeye salmon stocks. Steelhead re-introduction above the dams is considered a "long-term" objective because steelhead are an existing native, wild stock that is listed under the Endangered Species Act (ESA). Steelhead are currently not fully utilizing all of the accessible spawning and rearing habitat downstream of the YP storage dams. Therefore, it is premature to attempt to expand their distribution. Spring chinook salmon are considered a "long-term" objective for re-introduction above YP storage dams because all smolts produced at the Cle Elum Supplementation and Research Facility (CESRF) are fully allocated to a sophisticated experimental design and cannot be used for reintroduction experiments at this time. Pacific lamprey are very rare in the Yakima Subbasin and little is known about their life history, historic distribution, or current limiting factors, hence re-introduction of this species is also considered a long-term objective at this time.

Near-Term (2005): Coho Salmon

Coho salmon are the most suitable species for early feasibility research regarding juvenile passage at the existing storage dams in the Yakima system. Coho salmon smolts are currently being imported into the Yakima Basin for the Yakima-Klickitat Fisheries Project (YKFP) coho salmon reintroduction feasibility study. However, adult coho salmon returns to the basin are not sufficient to adequately seed currently available spawning and rearing habitat downstream of the storage reservoirs (hence the ongoing YKFP coho salmon reintroduction feasibility study). Therefore, adult coho salmon will not be available to trap elsewhere in the basin and haul above Cle Elum Dam to initiate natural spawning and juvenile production.

Sufficient numbers of hatchery coho salmon smolts are readily available every year, and therefore are a reliable source of smolting salmonids for evaluation of juvenile passage modifications at Cle Elum Dam. The expansion of the Yakima/Klickitat Fisheries Project coho salmon reintroduction study can easily provide 12,000 or more coho salmon smolts imported from a lower Columbia River hatchery for release into Cle Elum Lake. We can also increase the number of imported smolts for releases in Bumping Lake in future years for evaluation of interim downstream smolt passage. All (100%) of these smolts will be tagged with passive integrated transponder (PIT) tags to evaluate downstream passage survival passively using the newly installed PIT tag detection capability being constructed in the outlet flume of the modified gate structure. The main

group (10,000) of the PIT tagged coho salmon smolts will be released from net pens that have been installed within approximately one half mile of the modified outlet structure. A smaller group of 1000 smolts will be released immediately below the dam for survival comparison to Roza and Prosser dams with smolts released in the reservoir. The PIT tags will also be detectable at Chandler, McNary, and Bonneville dams. The third group of approximately 1000 PIT tagged smolts will be released in various sized groups directly into the outlet flume to calibrate the PIT tag efficiency of the new detection facility installed in the flume. The use of out-of-basin coho salmon smolts will be the most assured and biologically acceptable source for releasing sufficient numbers of salmon smolts for interim passage facility evaluation. Since evaluating the interim infrastructure modifications and juvenile passage efficiency is the immediate priority of this feasibility study, the smolts will be released in the reservoir in early spring (April) near the juvenile bypass facilities to assure that sufficient numbers of "physiologically-ready" migrant smolts are present to adequately test the facility. The smolts will be volitionally released from the net pens when smolts from other acclimation ponds within the upper Yakima begin actively migrating. The released smolts will be 100% PIT tagged.

The proposed timeline for the release in 2005 will be:

1. Coho salmon smolts (12,000) from lower Columbia hatchery will be PIT tagged in the winter of 2005 (February) as part of the YKFP Coho Reintroduction Feasibility Study
2. Smolts (10,000) will be placed in net pens within one half mile of the modified outlet gate structures of Lake Cle Elum in the late winter (February or March).
3. Smolts (from pool of 1000 smolts) will be released in various sized groups directly into the flume at different flows to calibrate the PIT tag detection efficiency of the facility.
4. Smolts from the above calibration release groups will be collected (by electrofishing or other methods) in the plunge pool or directly downstream after passing down the flume to determine if they sustained any injuries during their passage out of the lake.
5. Smolts will be volitionally released from the net pens when smolts are actively migrating from other acclimation sites in the upper Yakima (April through May).
6. Smolts (1000) will be released in various sized groups below the dam to compare downstream survival to mainstem dams between the groups released above and below the Cle Elum dam.
7. All PIT tag detections at the outlet flume will be recorded by project personnel and analyzed to determine outmigration success from Lake Cle Elum.

8. The information will be presented in a project report after completion of the study.
9. Planning will continue for the future evaluation of coho salmon as well as other species.
10. Evaluations in future years may also be expanded to include other locations in Cle Elum Lake and/or tributary releases to evaluate smolt migration through the reservoir and homing of returning adults to release tributaries. Smolts surviving from the reservoir releases will return as adults in the following fall and be available to utilize and evaluate interim adult fish passage facilities (e.g., "trap and haul").

Mid-Term: Sockeye Salmon

Sockeye salmon are the only species of salmon whose juveniles are always associated with lake rearing for some period of time during their juvenile stages. This species was present in all of the natural lakes in the Yakima system before the storage dams were constructed. We could potentially implement a reintroduction program for sockeye salmon if fish passage could be developed at the existing reservoirs.

Sockeye salmon would be less suitable than coho for the near-term evaluation of interim juvenile passage research at the two dams. This is because the availability of sockeye salmon smolts for research is much less reliable than coho salmon smolts. However, we should proceed with the development of a sockeye salmon reintroduction program as rapidly as possible to evaluate their ability to migrate downstream from the reservoirs, as they may have different migration patterns (depth, velocity, timing, etc.) from the coho salmon smolts. There is some question as to the appropriate donor stock of sockeye salmon to use for this reintroduction study. Donor stock would likely come from Lake Wenatchee or Lake Osoyoos (Canadian fish). A preliminary research effort to evaluate the feasibility of reintroduction of sockeye salmon into Cle Elum Lake used Lake Wenatchee stock in the late 1980s and early 1990s (Flagg et al. 2000). The lake Wenatchee stock is the closest stock to the Yakima (next river basin to the north), but the Lake Osoyoos stock may be the better stock for reintroduction into the Yakima Basin. The Lake Wenatchee stock spawn in late September and Lake Osoyoos stock spawn in early October. The Lake Osoyoos adult fish have to migrate up a very warm section of the Okanogan River to reach their spawning grounds. This environmental condition may be more similar to the lower Yakima River, as opposed to the cooler migration corridor through the lower Wenatchee River. WDFW and YN will continue to evaluate the two available stocks to determine donor stock suitability, availability, and the potential for spawning, incubating, and rearing juvenile sockeye salmon to the smolt life stage for release in Bumping and Cle Elum reservoirs.

Implementation of sockeye salmon reintroduction research could or should include:

1) The release of radio-tagged adults in the reservoirs to monitor the location and timing of any spawning activities in the streams above the dams, and 2) the release of smolts (10% PIT tagged; 100% coded wire tag (CWT)) to evaluate the outmigration success and survival of juveniles. The number of adults released will likely be limited by the abundance and availability of the donor stock and also the number of radio-tags. Cle Elum Lake sockeye salmon smolt production capacity (and the corresponding adult spawning escapement) will be estimated to determine optimum escapement. All disease prevention protocols prescribed by state and federal fish health officials will be followed in selecting and importing donor sockeye salmon eggs, juveniles and adults. Concern exists among the co-managers and the U.S. Fish and Wildlife Service regarding reintroduction of sockeye into the Yakima due to the disease status of existing Columbia Basin sockeye stocks. Careful monitoring and selection of disease free brood stock would be essential in a reintroduction effort to protect the other existing species of salmon currently in the Yakima watershed.

Returning adults from smolt releases would be collected at the Roza adult trap and transported above Cle Elum Dam for release, or captured at the base of Cle Elum Dam if interim adult passage facilities are constructed there. Interim adult passage would be necessary to provide access for Bumping Lake returning sockeye salmon adults since there are no suitable adult collection facilities in the lower Naches Basin.

Mid-Term: Spring Chinook Salmon

The YKFP is presently supplementing spring Chinook salmon in the basin using a complex, statistically-rigorous experimental design to evaluate new supplementation techniques (Busack et. al. 1997). We could possibly trap and haul adults at the Cle Elum River “Green Bridge” a short distance below the dam, but we would need to evaluate impacts on the YKFP program. The impacts would probably be minor if we only take about 100 adults to place above Cle Elum Dam. There is also the concern that we would not be able to determine adults destined to return to the Cle Elum at the Roza trap. Thus all spring Chinook salmon would be released upstream at Roza Trap and we would have to re-trap and haul adult fish attempting to return to the upper Cle Elum at the base of the Cle Elum Dam.

Long-Term: Steelhead

It is not likely that we would attempt to reintroduce steelhead above Cle Elum Dam anytime soon. Only about 100-200 steelhead adults pass Roza Dam annually. There are too few steelhead in the Upper Yakima to include them in a forced re-introduction

experiment at this time. Current efforts to improve steelhead status in the upper Yakima Basin will focus on increasing the status and productivity of the existing steelhead population in the mainstem and tributaries downstream of storage reservoirs. There are also ESA issues involved in trapping and handling listed fish at both the juvenile and adult stages that are a significant obstacle to active, "hands-on" supplementation. There is currently no Yakima/Klickitat Fisheries Project program to supplement natural production of steelhead with hatchery-reared smolts. For the foreseeable future, steelhead restoration will be limited to the experimental "kelt reconditioning" program located at the Chandler Hatchery at Prosser. At this time, reconditioned kelts will not be trucked and released above Bumping or Cle Elum Dam.

Long-Term: Pacific Lamprey

The Yakama Nation is currently undertaking development of a Pacific lamprey reintroduction plan for the entire Yakima basin. The areas above the reservoir dams will be considered and included in these plans as they are being developed.

Fish Health Issues:

- All introduced stocks and/or populations transported to Lake Cle Elum or above the current supplementation facilities must be inspected for presence of salmonid viruses, and the presence, prevalence, and magnitude of Renibacterium salmoninarum, Flavobacterium psychrophilus, Aeromonas salmonicida, and Yersinia ruckeri. In addition, a host of external and internal parasites especially Ichthyophthirius could be amplified and spread downstream. Although some of these pathogens are wide spread and may be difficult to eliminate from some introduced stocks, each introduction should withstand the scrutiny of risk assessment (including the possibility of drug resistance) in perspective to potential impacts to native and cultured fish below the point of introduction.

- Any introduced juvenile stocks that will be confined for a period of time, must be monitored periodically during their captivity. Health and pathogen status must be communicated to the YKFP and CESRF staff during this period and prior to any releases.

- During any captive holding of introduced stocks, if any mortality, morbidity, or infection occurs that is deemed hazardous to native or cultured stocks below the point of captivity, those fish must be destroyed and the holding facility properly sanitized or disinfected.

Specific procedures and comments:

- All sockeye salmon introductions must include preventative measures to reduce the probability of spreading Infectious Hematopoietic Necrosis Virus (IHNV), or Renibacterium salmoninarum (the causative agent for BKD) This species of fish is extremely sensitive to these pathogens and will readily amplify them to the detriment of other susceptible salmonids (i.e. steelhead, rainbow trout, and Chinook). It is highly recommended to introduce only fish/eggs that have been individually screened to be free of IHN and have extremely low levels of the antigen for BKD.

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