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

March 5, 2019

MEMORANDUM

TO: **Fish and Wildlife Committee Members**

FROM: **Mark Fritsch**

SUBJECT: **Step 2 review of Klickitat River Spring Chinook Master Plan (YKFP-Klickitat Design and Construction, Project #1988-115-35).**

PROPOSED ACTION: Council staff recommends to the Fish and Wildlife Committee, based on the ISRP review, past Council recommendation, and the history of this project, that the conditions placed on this project have been met and the Yakama Nation can proceed to implementation. Details associated with the final design and out-year costs will be presented to the Council prior to construction.

SIGNIFICANCE: On March 21, 2018 the Yakama Nation submitted Step 2 documents to the Council for the "Klickitat River Spring Chinook Master Plan" intended to be an update and responsive to the ISRP (ISRP document 2013-01) and the previous Council decision. This submittal is a revision of the *Klickitat Anadromous Fish Master Plan* as received and reviewed in 2012 and 2013 regarding a proposed multispecies hatchery reform initiative. It is important to recognize that it has been nearly six years since the last submittal and review, and priorities have changed. Since that time the YN as part of the implementation of the 2008 Fish Accords (MOA) and because of limited capital funds currently available within the Accord and Accord Extension budget (acting in accordance with BPA funding priorities) has focused on facilities for an integrated broodstock program for Klickitat Spring Chinook.

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The revised Klickitat Spring Chinook Master Plan (MP) has as its primary goal to increase the number and distribution of spring Chinook within the Klickitat Subbasin. To achieve this goal, the YN is proposing to convert the existing segregated harvest program to an integrated broodstock program. The program is designed to increase the viability of the natural population while simultaneously producing the adults needed to meet the established 4,000 fish harvest objective for all fisheries combined. To achieve these objectives, it is estimated that the hatchery program should release 800,000 yearling smolts annually.

BUDGETARY/ECONOMIC IMPACTS

Based on the 2008 Accords, there is a remaining Bonneville Power Administration (Bonneville) capital commitment of $10,962,559 towards construction related to the new and renovated facilities outlined in the MP, of which Bonneville programs 20% towards construction related contingencies. And there is a remaining Bonneville expense commitment $1,673,828 for final design, permitting and construction management These values are relatively consistent with the YN's MP cost estimates for construction of $10,962,559 capital and expenses estimates of $1,400,109.

Bonneville is not currently funding the annual operation and maintenance at the hatchery and is working with YN and NOAA Fisheries to ensure operations and maintenance post-construction is covered under Mitchell Act appropriations[1]. Yakama Nation estimates annual operation and maintenance costs associated with post-construction spring Chinook upgrades will range from $294,175 in 2020 to $349,682 in 2028. Bonneville currently funds annual operations and maintenance for activities (under project 1997-013-35) as they relate to O&M of Lyle Falls fishway, Castile Falls fishway and a field office.

Bonneville currently funds annual monitoring and evaluation for activities (under project 1995-063-35) that inform and support the status and success of natural-origin fish[2] The BPA funding commitment within the Accord extension ranges from $1,579,113 to $1,618,838 per year.

Capital funds for the new and renovated facilities addressed in the master plan are reserved in 2008 Memorandum of Agreement (MOA) budgets associated with the projects in the Klickitat subbasin[3]. Key construction elements will include:

[1] Outyear operation and maintenance funding will be addressed between the YN, Bonneville, and NOAA in a separate agreement through which the current Mitchell Act budget for the hatchery would be augmented with Mitchell Act funds to cover the cost of spring Chinook program operations

[2] Cover Letter to Tony Grover, April 4, 2018. "Bonneville expects the Service to assume responsibility for any new or expanded M&E associated with the Klickitat Hatchery programs".

[3] Memorandum Of Agreement among the Umatilla, Warm Springs and Yakama Tribes, Bonneville Power Administration, U.S. Army Corps of Engineers, and U.S. Bureau of Reclamation. April 2008.

- Upgrade spring water intake and water transmission pipeline.
- Construct new circular rearing tanks with river water supply
- Reconstruct on-station volunteer ladder/trap, adult holding chambers, and spawning building
- Reconfigured pollution abatement system

BACKGROUND

The Klickitat River subbasin supports two species of Pacific salmon, Chinook (*Oncorhynchus tshawytscha*) and coho (*Oncorhynchus kisutch*), as well as steelhead (*Oncorhynchus mykiss*). These three species of anadromous fish are composed of six stocks: three Chinook (spring, early run fall [tule], late run fall [upriver bright]); two steelhead (summer, winter); and one late-run coho stock. Spring Chinook and summer steelhead are known to have existed historically in the watershed, and winter steelhead are presumed to have existed historically. Klickitat steelhead are part of the Mid-Columbia Evolutionarily Significant Unit (ESU), which has been listed as threatened under the Endangered Species Act.

Fall Chinook and coho are not native to the Klickitat. They were introduced in the late 1940s and early 1950s, with the construction of both the Washington Department of Fisheries hatchery and the fishway at Lyle Falls (1952).

Spring and fall Chinook and coho salmon stocks have been augmented or even sustained by the Klickitat Hatchery. Summer steelhead production is augmented with Skamania stock direct rivers plants from the Washougal Hatchery. Completed in 1952, the hatchery is located on the Klickitat River at RM 42.4. The hatchery was constructed and operated by the Washington Department of Fish and Wildlife under the Mitchell Act of 1936. The *U.S. v. Oregon* Columbia River Fish Management Plan (2018) governs fish production at this facility.

Hatchery production is greater than natural production of Chinook and coho. Four million eyed eggs of fall “upriver bright” (URB) Chinook stock are delivered annually to the Klickitat Hatchery from Little White National Fish Hatchery and/or Priest Rapids hatcheries for final rearing and on-station release into the Klickitat River. The purpose of the URB release is to provide ocean, Columbia River, and terminal fishery for tribal and other fishers. Up to a total of 3.85 million coho smolts are also released into the Klickitat River annually, approximately 1 million smolts are reared at the Klickitat Hatchery for an on-station release. The remaining 2.5 million are released directly into the river at several locations in the lower 10 miles of the Klickitat River.

Pacific lamprey (*Lampetra tridentatus*) is another anadromous species of interest and cultural importance in the Klickitat subbasin, although historic and present distribution and status are not yet well understood.

Resident fish in the Klickitat include rainbow, westslope cutthroat, and brook and bull trout. Naturally reproducing populations of rainbow trout are found within the mainstem from the Columbia River confluence to RM 85, and in virtually all tributaries. Cutthroat were observed in limited numbers within McCreedy and Summit creeks during the 1980s; however, none was observed during a late 1990s reinvestigation. The historic and present distribution and status are relatively unknown. Brook trout were introduced into the Klickitat subbasin in the late 1970s and early 1980s, primarily in high mountain lakes. Currently, natural reproducing brook trout populations are found throughout the upper Klickitat mainstem and in major tributaries upstream of Big Muddy Creek (RM 53.8).

I. History and development of Klickitat Subbasin Master Plans, 2001 - 2013

For Fiscal Year 2001, projects in the Columbia Gorge Province were subject to the in-depth province-based review. This province includes the Klickitat subbasin. The primary fisheries management activities in the Klickitat subbasin have been passage and artificial production initiatives dating back to the early 1950s. Most of this work was funded by sources other than Bonneville - with Mitchell Act funding being a substantial source. More recently, Bonneville funding has been provided to the activities in the Klickitat as a component of the co-managed Yakama Nation (YN) and Washington Department of Fish & Wildlife's Yakima-Klickitat Fisheries Project (YKFP).

As part of the Council decision for the Columbia Gorge Province, the Council staff worked with the Yakama Nation (YKFP Lead Agency) fisheries staff to outline a Major Project Review sequence encompassing the proposed passage and production facilities.

A master plan, as the first step in the Major Project Review process for this project, was prepared by the Yakama Nation and Bonneville and submitted to the Council on November 12, 2004[4].

The master plan proposed supplementation and natural production efforts in the Klickitat subbasin on spring Chinook and steelhead, while maintaining a focus on harvest augmentation for fall Chinook and coho. In doing so, the project intended to increase production of spring Chinook and steelhead at the Klickitat Hatchery and eliminate in-basin artificial production of coho. In-basin fall Chinook production levels would remain the same, but half the production would be transferred from Klickitat Hatchery to a proposed new facility at Wahkiacus. Additionally, the program proposed further improvements to existing passage facilities that would increase the ability of spring Chinook and steelhead to access high-quality habitat, thus improving natural

[4] The Council received the updated Master Plan on November 12, 2004 regarding the project titled *YKFP-Klickitat Design and Construction*, Project #1988-115-35. An earlier version of this Master Plan was submitted on May 11, 2004 and provided to the ISRP in June 2004. In July, as part of the subbasin plan reviews, the ISRP heard a presentation on the relation of the Master Plan to the Klickitat Subbasin Plan. However, the Master Plan was withdrawn from the review process on July 8, 2004.

production; and would allow collection of spring Chinook and steelhead broodstock to meet supplementation goals for those two species.

On March 15, 2005 the Council released an issue paper (Council Document 2005-03) seeking comment on the master plan. In particular, public comment was requested on key issues listed in the issue paper. On May 24, 2005 Bonneville provided comments on the master plan. Bonneville's concerns regarded the need for additional detail on the funding and responsibility for the Mitchell Act facilities, cost-sharing, and response to the Independent Science Review Panel's (ISRP) comments—particularly those related to cost-effectiveness and the integration of hatchery, harvest, and habitat objectives[5].

On February 19, 2005 the Council received the initial review (ISRP Document 2005-7) of the Klickitat Subbasin Anadromous Fishery Master Plan (*YKFP-Klickitat Design and Construction*, Project #1988-115-35) by the ISRP[6]. The ISRP stated that the master plan needed further consideration and development to meet the standards of scientific soundness and consistency with the fish and wildlife program's scientific principles. As part of this review the ISRP outlined seven primary concerns. Most of those concerns were focused on the hatchery production strategies and objectives, rather than the proposed improvements to the existing passage facilities.

On April 15, 2005 the Yakama Nation responded to the ISRP review. The Yakama Nation was deeply concerned regarding the nature of the ISRP comments as they related to fishery resource management decisions that have been made through the *U.S. v. Oregon* planning process and requested that the biological issues raised by the ISRP be dealt with as part of the Step 2 submittal.

On May 9, 2005 Council and Bonneville staffs met with Yakama Nation staff to discuss the concerns and issues that surround the master plan. During this meeting it was determined that the Yakama Nation needed to respond to the questions and concerns that the ISRP raised as part of its review of the master plan (ISRP Document 2005-7).

On August 25, 2005 the Yakama Nation responded to concerns that the ISRP had identified as part of its review of the master plan. The submitted information was provided to the ISRP in early September, and on November 1, 2005 the ISRP provided its response (ISRP Document 2005-16). In part, the ISRP stated:

> *"The ISRP recommends that the Klickitat Subbasin Anadromous Fishery Master Plan remain in the Step 1 stage of the Three Step process until adequate scientific detail and biological justification for the proposed activities are given. The August 25, 2005 response from the Yakama Nation to the ISRP's Step-1 review (ISRP 2005-7; February 19, 2005) provided some additional information, as noted in the attached report, but needs to further address many of the previously identified technical shortcomings of the Master Plan. The foundation assessments for the changes to artificial production in the Klickitat subbasin are*

[5] No other comments were received during the comment period that closed on May 13, 2005.
[6] On November 18, 2004 the Council staff submitted the master plan to the ISRP.

not yet completed; thus, there is no basis for the ISRP to recommend support to the Council for the changes to artificial production proposed by the Yakama Nation. The ISRP recommends a revised and complete (i.e., stand-alone) Master Plan be developed prior to moving to a Step-2 review. This revised Master Plan should capture the responses, and subsequent responses-to-responses on science and technical details."

Based on this review and follow-up discussions with the Yakama Nation, Bonneville and the Council staffs determined that the master plan would need to be revised. Concurrent to these discussions the Fiscal Year 2007 - 2009 solicitation process was underway and concerns were raised regarding the alignment to the anticipated Fiscal Year 2007 - 2009 decision in October of 2006.

In an effort to maintain the momentum of the planning and design phase of the project, but also recognizing the shortcomings of the current master plan, an option was discussed that outlined an opportunity to proceed with environmental review and associated permitting associated with the adult collection facilities at Castile Falls and the major reconstruction of the fishway at Lyle Falls.

On March 15, 2006 the Council recommend $473,000 in Fiscal Year 2006 funds to initiate a separate environmental review for the adult monitoring facility at Castile Falls and Lyle Falls[7] *and* to provide initial funding to address the shortcomings of the current master plan, subject to the following conditions: (1) that all future activities associated with this project, including completion of the environmental review, will be defined as part of the Issue Document associated with the anticipated Fiscal Year 2007 - 2009 decision in October of 2006; (2) that even with Lyle and Castile falls passage portions of the original master plan proceeding separately, the Council and Bonneville will need confirmation that the revised master plan and submittal has addressed adequately the ISRP concerns and the other concerns[8] raised during the comment period.

In making its final Fiscal Year 2007 - 2009 project funding recommendations to Bonneville at its October 2006 meeting, the Council recommended that Project #1988-115-35, *YKFP-Klickitat Design and Construction* be funded. This recommendation was conditioned on the understanding that construction of the proposed facilities is dependent on a favorable step review.

On April 17, 2008, the Council received from the Yakama Nation a Master Plan regarding the project titled *YKFP-Klickitat Design and Construction*, Project #1988-115-

[7] Lyle Falls Passage Project Draft Environmental Impact Statement issued March 2008 DOE/EIS-0397, with anticipated Final and ROD by January 2009. BPA concluded a BA and Checklist would be sufficient for the Castile Falls Enumeration Facility.

[8] Letter received from Bonneville dated May 17, 2005. These concerns not only concurred with the ISRP issues, but also raised relationship and in-lieu funding issues surrounding the proposed artificial production portions of the current master plan to the existing Mitchell Act facilities (e.g., concerns regarding the implications of Mitchell Act funds and the relationship to program funds in the out-years needs to be resolved). Bonneville has determined that it can fund the environmental review without violating it's in lieu funding policy but feels that issue will need to be fully addressed as part of a future step decision as this project is sequenced.

35. The Master Plan recognized that to be successful, actions must be integrated across what the region refers to as the "4 Hs" (Hatcheries, Habitat, Harvest, and Hydro). The Master Plan (MP) focused primarily on Habitat, Hatcheries, and Harvest, but the effect of the mainstem Columbia River dams (Hydro) on the survival of fish populations originating in the Klickitat River was taken into consideration when setting hatchery release numbers, adult escapement, and harvest goals. The primary goal of the 2008 MP was to increase in the number and distribution of steelhead and spring Chinook, while maintaining harvest levels but reducing the distribution of fall Chinook, and coho within the Klickitat Subbasin. In addition, habitat improvements resulting from the proposed programs were expected to benefit listed bull trout, lamprey, and other non-listed species.

The two-pronged approach of the MP was to focus on an integrated hatchery approach spring Chinook and summer steelhead programs, with a separate focus on a segregated hatchery program for coho and fall Chinook harvest augmentation programs using local broodstock. The strategy was to increase production of spring Chinook and summer steelhead at the Klickitat Hatchery by transferring all in-basin hatchery coho production and half the fall Chinook production to the lower Klickitat River (i.e., Wahkiacus facility). The Yakama Nation was proposing initially (year one of implementation) to eliminate coho smolt production at Klickitat Hatchery and increase production of spring Chinook at the hatchery from 600,000 to 800,000 smolts. The integrated summer steelhead program would consist of 130,000 steelhead using local broodstock, also released from the Klickitat Hatchery (McCreedy Creek Acclimation Site remains a possible site if natural re-colonization above Castile Falls is not successful[9]). Following the initial effort, the 2008 MP proposed to transfer half the fall Chinook production (2 million) from Klickitat Hatchery to the Wahkiacus facility, lower in the basin.

On June 17, 2008, the ISRP provided the Council with their review of the Klickitat Anadromous Fisheries Master Plan (ISRP document 2008-6). The ISRP found that the master plan "Meets Scientific Review Criteria (Qualified)".

The ISRP found the master plan to be thorough in addressing the needs of the review process. They provided a "Qualified" recommendation to ensure that the additional detailed requested in their review be address as part of the Step 2 review. The ISRP requested that a decision tree that would function as a management tool to guide management actions based on monitored results and actions.

The ISRP highlighted three attributes that they found to be "progressive". This included the inclusion of habitat strategies for each targeted species, the qualification that "supplementation" may not achieve its objectives, the allowance of natural colonization and the use of local stocks.

[9] McCreedy Creek has been identified as a potential water source for a juvenile fish acclimation site. Further studies will be conducted over the next ten years to determine its suitability and whether it is needed.

In addition, the ISRP requested specific information in regard to previous ISRP review recommendations in addition to other specific issues to be addressed as part of the step 2 submittal (ISRP document 2008-6, pages 3 - 11). This request included development of the following information.

- Detail regarding steelhead recruit analysis and harvest
- Detail regarding on the determination of spring Chinook release sizes, recruits-per-spawner, and harvest
- Information regarding balance broodstock collection, hatchery smolt yield, and anticipated SAR with the harvest and stock conservation.
- Summary and synthesis of ecological benefits
- Confirmation of study design and statistical validation of tagging rates and tag recovery
- Information addressing the conditions of termination of supplementation above Castile Falls should also be outlined in the requested "decision tree"

On August 13, 2008 the Council approved the Step 1 review of the Klickitat River Anadromous Fisheries Master Plan (*Klickitat Fishery YKFP Design*, Project #1988-115-35) and recommended with conditions activities associated with step 2, as follows.

- *The Council approved the Klickitat River Anadromous Fisheries Master Plan to proceed to step two level activities, but due to the discrepancy between the total estimated construction costs in the master plan for Project #1988-115-35, YKFP-Klickitat Design and Construction and the MOA reserve of $26,775,000 (i.e., the master plan reflects a cost that is $9,814,000 higher than the MOA reserve) did not approve a specific budget associated with this action. To assist with future decision associated with this project the Council requested that additional detail regarding the accounting (e.g., implementation planning budgets vs. funds identified in a MOA) be provide as part of the Step 2 submittal*.

- *In addition, the sequence outlined for project 1988-115-35 in the MOA reflects construction of the Castile and Lyle Falls facilities in 2009. Based on past Council decisions and the recent ISRP review, if the final permits are secured prior to the step 2 submittal (late 2009), the Council recommends that the construction of these facilities be addressed through the BOG process[10].*

- *The Council calls for additional information to be developed that fully addresses the issues raised by the independent peer review for consideration during the Step 2 review.*

On July 18, 2012 the Council received a revised master plan and supporting documents from the YN. The intent of the submittal was to address the conditions placed on the project (outlined above) based on the guidance provided by the ISRP (ISRP document

[10] The 2008 Fish Accord funds were subsequently used for the construction and improvements to Lyle Falls and Castile Falls fishways.

2008-6). On July 24, 2012 the documents were submitted to the ISRP. On August 6, 2012 an errata letter was received and sent to the ISRP that addressed corrections needed between the EIS and HGMP to the recently submitted master plan.

On September 7, 2012 the ISRP requested a response from the YN (ISRP document 2012-12). Specifically, the ISRP found that qualifications identified in the 2008 Step 1 review were not sufficiently addressed. In order to complete Step 2, the ISRP recommends that responses are needed to further address the 2008 qualifications and to provide specific information related to three production components in the Master Plan. These production components are (1) Segregated Steelhead Harvest Program, (2) Integrated Steelhead Supplementation/Conservation Program, and (3) Integrated Spring Chinook Harvest Program.

On January 4, 2013 the Council received the YN response to the ISRP, and on March 5, 2013 the ISRP provided their review (ISRP document 2013-01). The ISRP provide their review recommendations into three areas. Generally, the ISRP found activities associated with steelhead supplementation, and spring Chinook integrated harvest and supplementation met scientific review criteria (qualified) and that additional information on the steelhead harvest activities needs additional information (i.e., response requested). Based on this review the YN, Bonneville and Council staffs determined that a response is warranted.

On May 1, 2013 the YN submitted a response to address the request regarding the segregated steelhead harvest. The remaining two qualifications (i.e., qualified) were deferred to the Step review requested stemming from the ISRP's last review (ISRP document 2013-01). On May 10, 2013 the ISRP acknowledged their response requested regarding the segregated steelhead program is not part of the BPA funded Yakama Nation Master Plan and thus appears to be outside the Council and ISRP project review process.

On March 21, 2018 the YN submitted a Master Plan, titled "Klickitat River Spring Chinook Master Plan", intended to be a response and update to the ISRP's last review (ISRP document 2013-01) and the previous Council recommendation and decision. It is important to note that the focus of the 2018 Master Plan is no longer a multispecies approach but is now solely addressing the needs of Spring Chinook in the Klickitat Subbasin[11]. On May 11, 2018 the ISRP requested a response (ISRP document 2018-4), and on September 14, 2018 the YN provided the additional information and clarity intended to address the request from the ISRP.

On November 2, 2018 the ISRP provided their review (ISRP document 2018-10). The ISRP found that the Klickitat River Spring Chinook Master Plan *meets scientific review criteria (qualified)*.

[11] On April 4, 2018 the Council received a letter for Bonneville supporting the transition to addressing only the spring Chinook program and provides clarity on their position regarding long-term operations and maintenance, and monitoring and evaluation associated with the Klickitat Hatchery.

ANALYSIS

The ISRP found the submittals and reviews to date have answered their review criteria questions. The four qualifications raised by the ISRP are intended to provide clarity and detail as the hatchery moves forward to implementation and strengthen the project for future reviews. It is important to note that the ISRP commented on the YN's use of a model that forecasted ocean conditions and implications to the SAR's for the Klickitat MP – this is a first in the Council's step review process.

The YN are planning, once details are worked out regarding final design, and out-year costs, to present these details to the Council and confirm how they addressed the ISRP qualifications. It is anticipated that the final contracting for design will not begin until summer 2019 followed by completion of the NEPA process and a final decision on construction anticipated by November 2020. It is anticipated at this time that groundbreaking would be late 2020 or early 2021.

Council staff recommends to the Fish and Wildlife Committee, based on the ISRP review, past Council recommendation, and the history of this project, that the conditions placed on this project have been met and the Yakama Nation can proceed to implementation. Details associated with the final design and out-year costs will be presented to the Council prior to construction.

Klickitat River Spring Chinook Master Plan
Pathway to Hatchery Reform

Northwest Power & Conservation Council

February 12, 2019

Bill Sharp, Research Scientist
Chris Frederiksen, Research Scientist

Presentation Outline:

- Background
- Spring Chinook Conservation Program
- Subbasin Habitat Actions

Klickitat River Spring Chinook Master Plan Overview

Native Stocks:

I. Spring Chinook

II. Steelhead

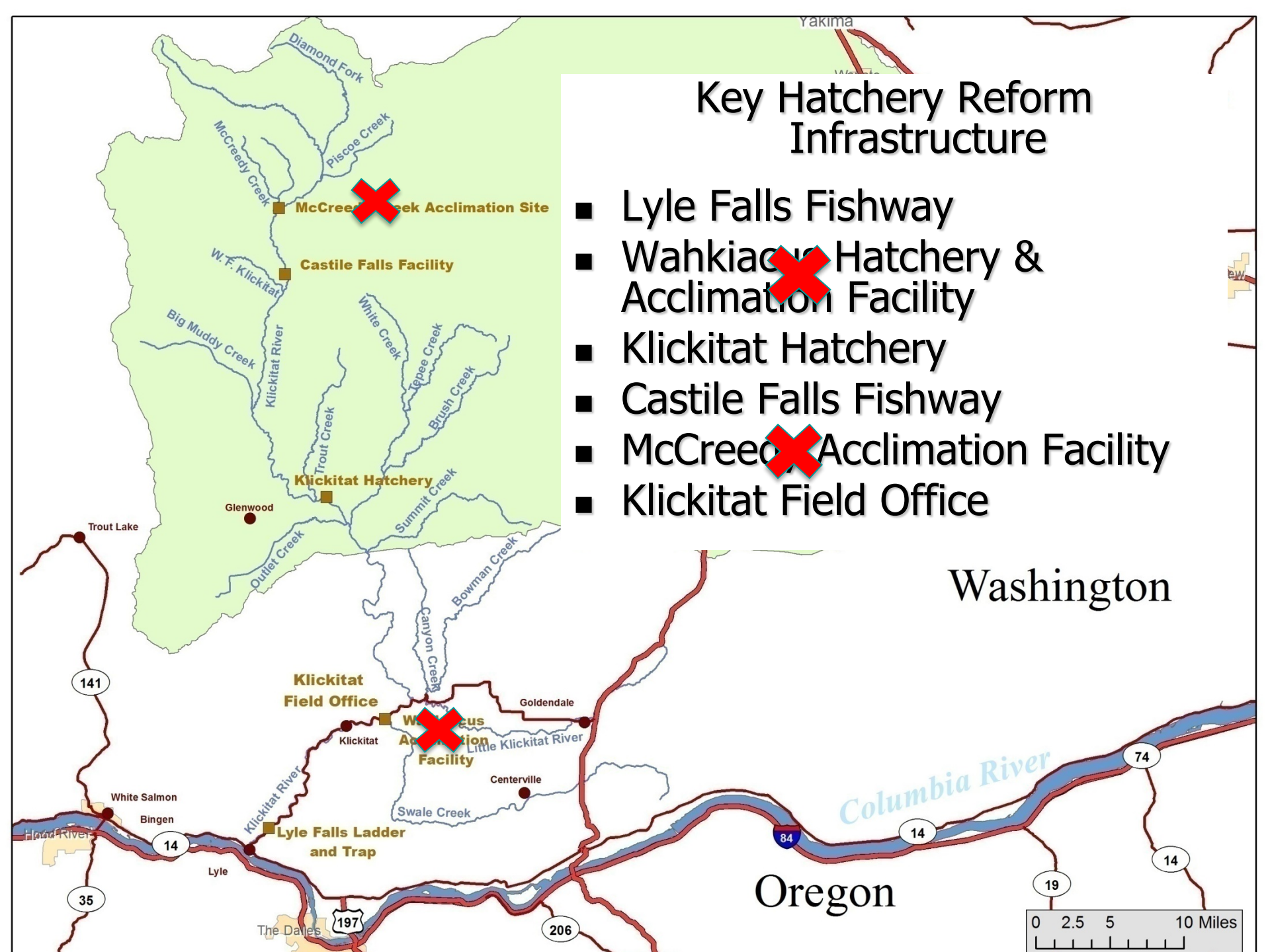
Introduced Stocks:

I. Fall Chinook

II. Coho

- All stocks have existing artificial (hatchery) production

  - Programs designed for harvest augmentation


Key Hatchery Reform Infrastructure
Lyle Falls Fishway
Wahkiacus Hatchery & Acclimation Facility
Klickitat Hatchery
Castile Falls Fishway
McCreedy Creek Acclimation Facility
Klickitat Field Office
Diamond Fork
McCreedy Creek
Piscoe Creek
McCreedy Creek Acclimation Site
W.F. Klickitat
Castile Falls Facility
Big Muddy Creek
Klickitat River
White Creek
Tepee Creek
Brush Creek
Trout Creek
Klickitat Hatchery
Glenwood
Trout Lake
Summit Creek
Outlet Creek
Bowman Creek
Canyon Creek
Klickitat Field Office
Goldendale
Klickitat
Wahkiacus Acclimation Facility
Little Klickitat River
Centerville
Swale Creek
Lyle Falls Ladder and Trap
White Salmon
Bingen
Hood River
Lyle
The Dalles
Columbia River
Washington
Oregon
141
14
35
197
206
84
74
19
0 2.5 5 10 Miles

Klickitat Subbasin Monitoring & Evaluation Project

Lyle Falls Monitoring & Collection Facility

Castile Falls Monitoring Facility

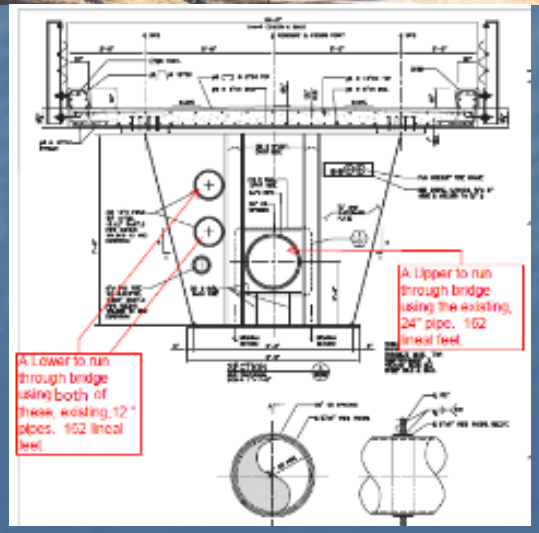
<u>Goals:</u>

Monitor status and trends in abundance, distribution, productivity, life history and diversity, and habitat of anadromous salmonids.

Monitor and evaluate effectiveness of hatchery and habitat actions

Began in 1995

Accord Bridge Project, 2010.



NOAA Actions (Hatchery Reform & PCSRF Funding):

Infrastructure improvements:

- 3-Phase power
- Chilled incubation water to improve smolt survival
- Juvenile transfer lines
- Fish Transport

Spring Chinook Focused Key Capital Actions:

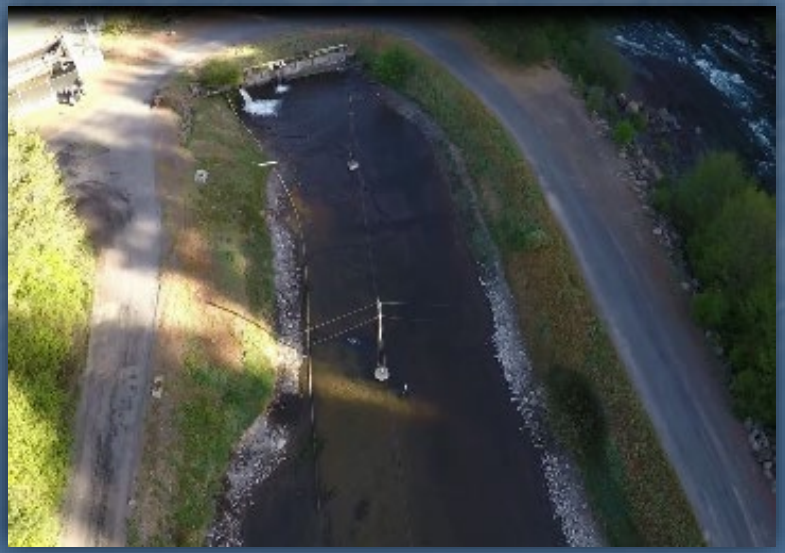
1. Reroute main spring-water pipeline through bridge
2. Construct new circular tanks (river acclimation) for spring Chinook
3. Rebuild adult holding & spawning building Dual purposes (juveniles/adults in large concrete raceways)
4. Reconfigure Pollution Abatement

1

2

3

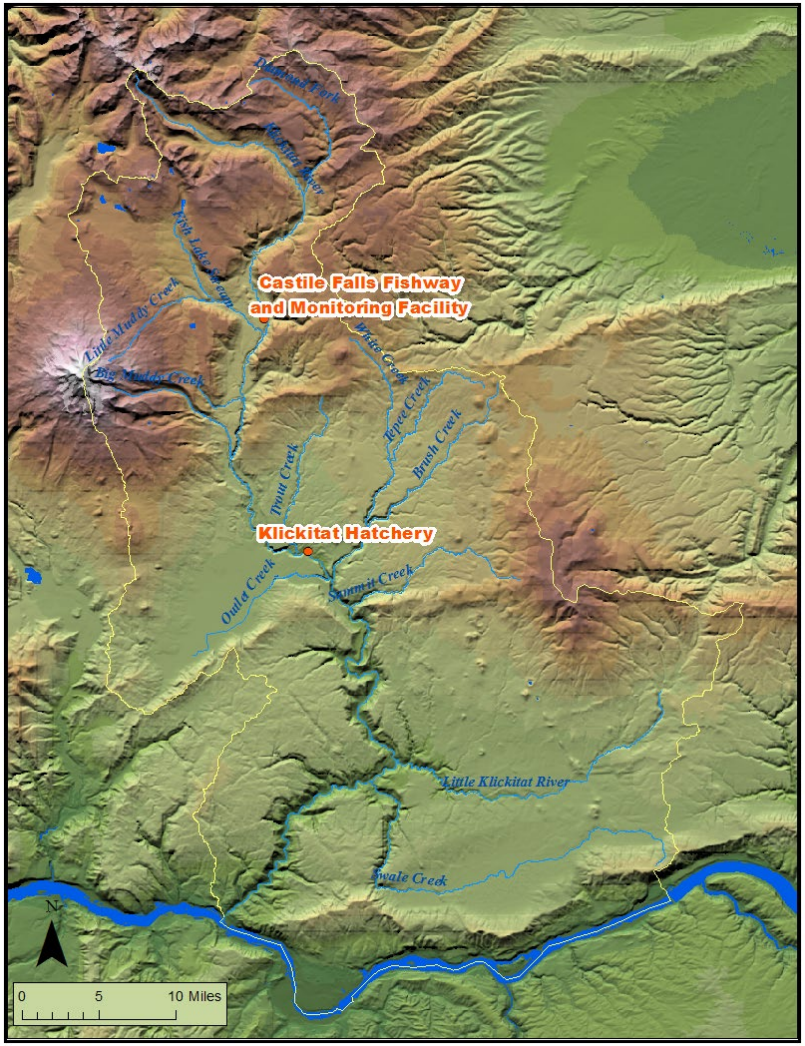
4



Klickitat River Spring Chinook Overview

Chris Frederiksen & Joe Zendt

Spring Chinook Management Objectives:



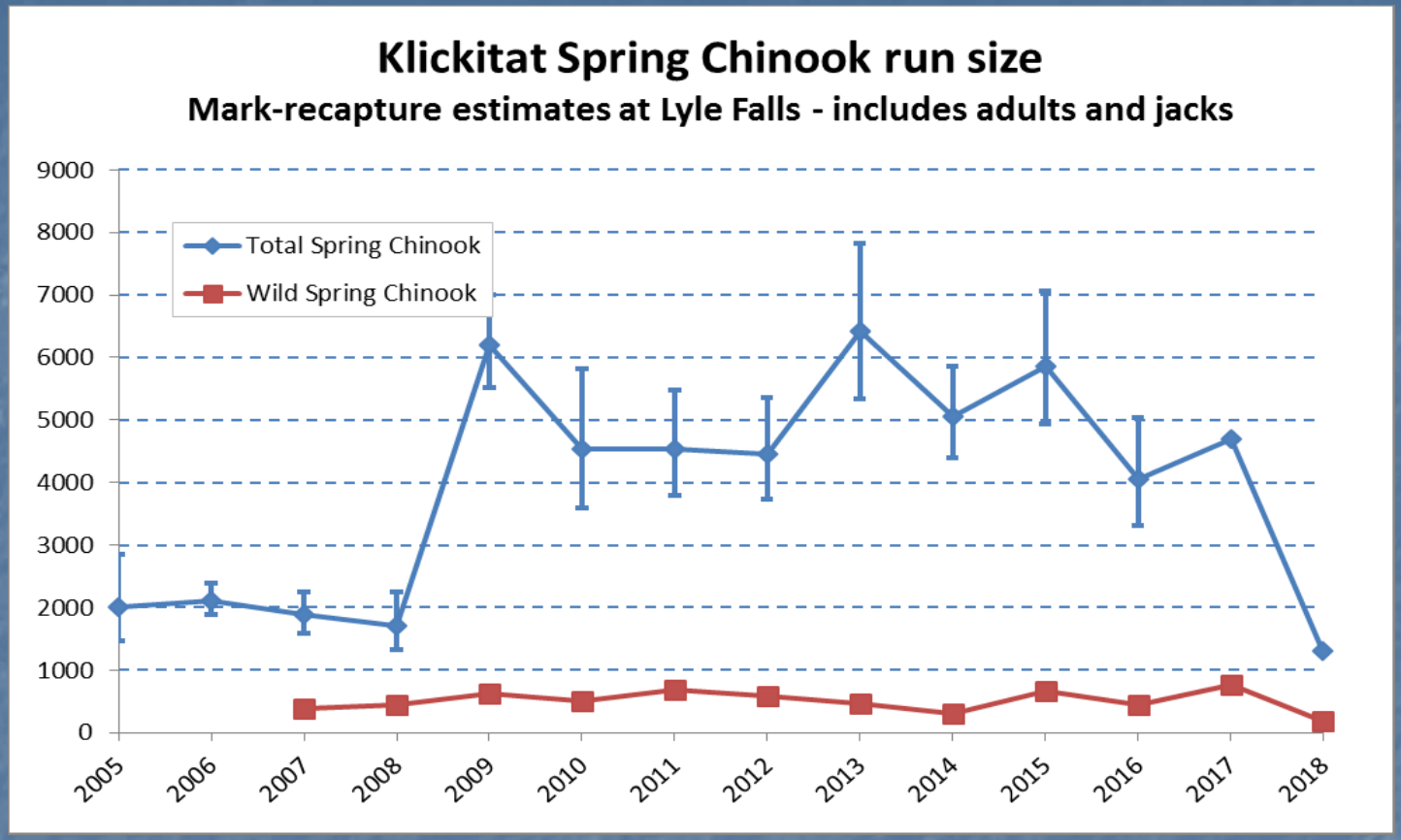
Overarching Conservation Goal:

- *Increase natural population's viability*

➢ Strategies:

- Implement hatchery reform measures
- Recolonize upper watershed
- Address environmental limiting factors with ongoing habitat restoration

Spring Chinook: Stock Status Review

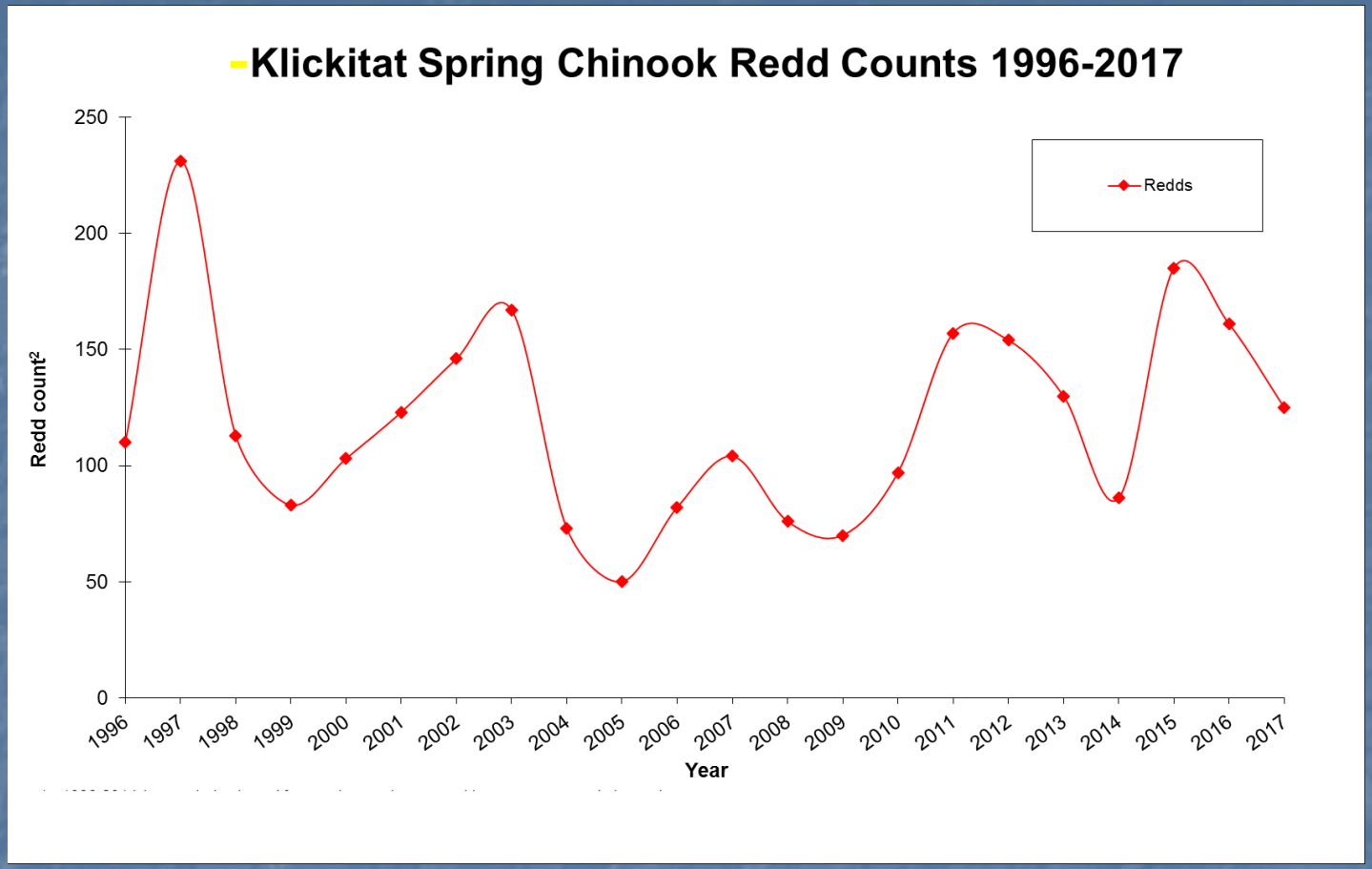


Adult abundance estimates:

- Hatchery Origin: ~1,137 – 5,959
- Natural Origin: ~179 – 685

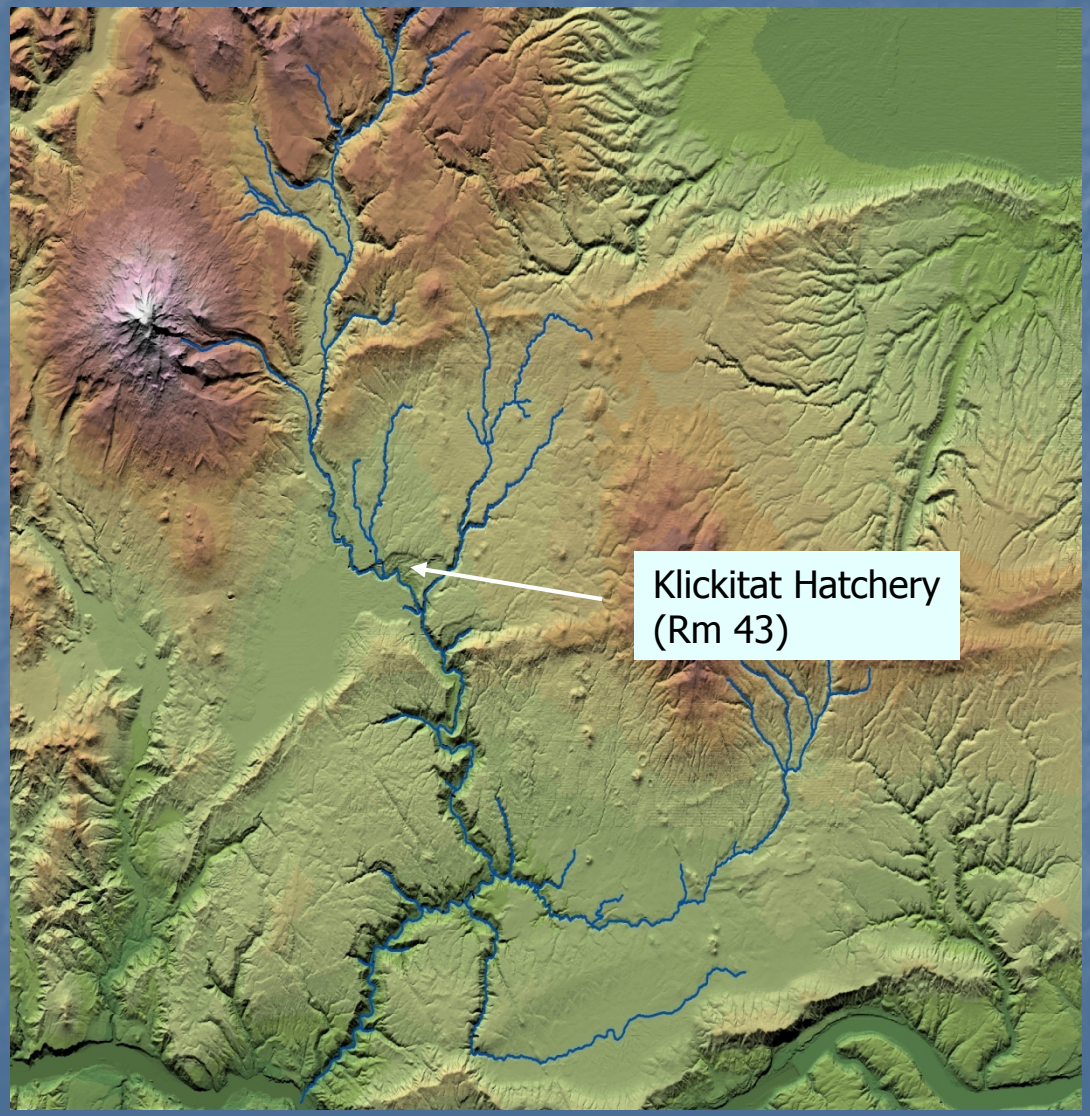
* Historical Abundance 4-6K

Spring Chinook: Stock Status Review



1996-2017 Redd Counts: 50 – 231

Spring Chinook



Current program

- Segregated Practices
  - ~550 adults
  - 95-100% hatchery broodstock
  - ~600k on-station release
  - PHOS ~ 38%
    - PNI= 0.15?

Hatchery Reform: Why?

- Recent study: Introgression with upper Columbia summer Chinook (ocean type)

- Introgression likely came from summer Chinook stocked in late 1970's

- 70+ Years of propogation:
  - 0-5% NOR Broodstock!

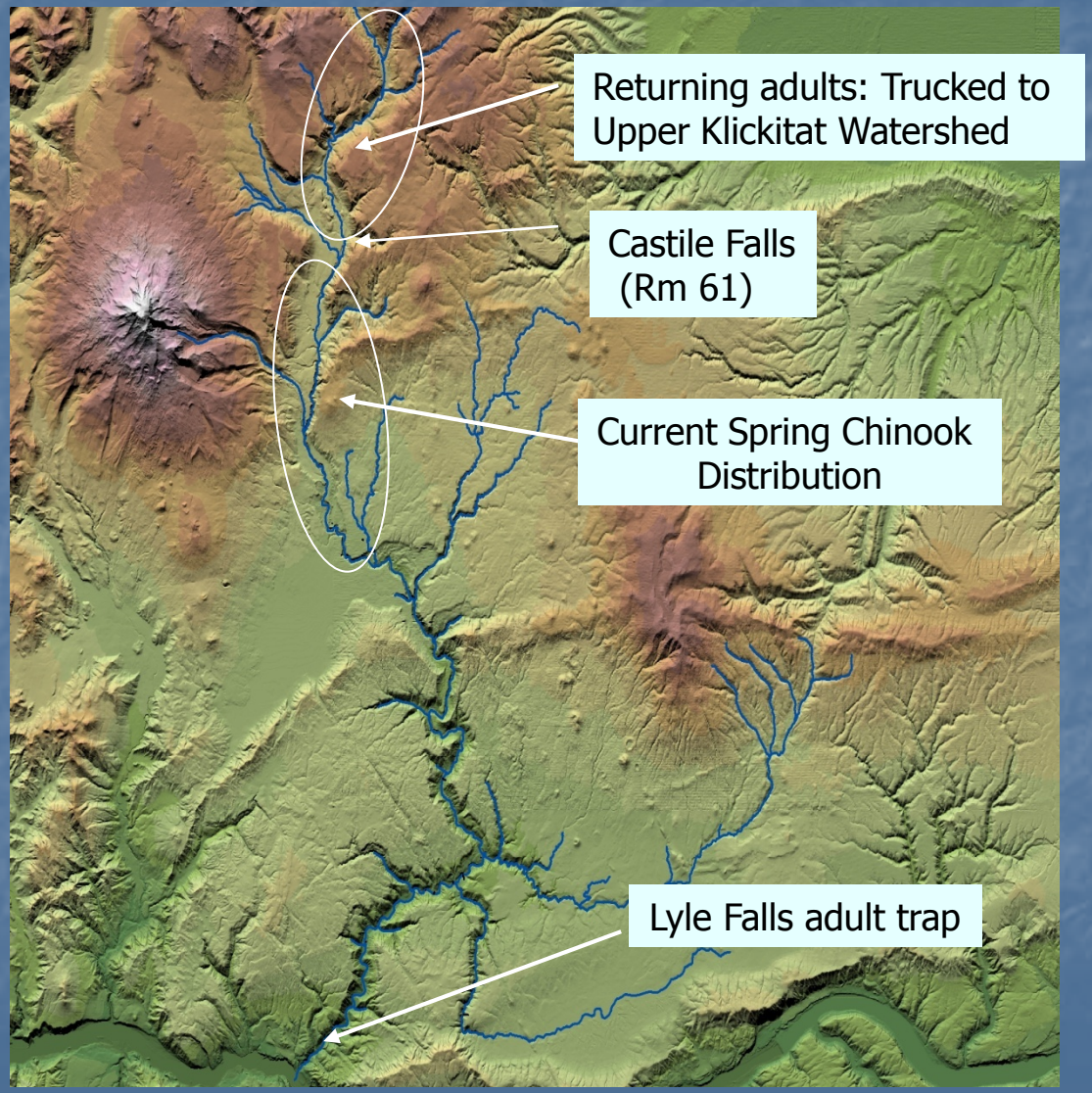
Introgressive hybridization among major Columbia River Chinook salmon (*Oncorhynchus tshawytscha*) lineages within the Klickitat River due to hatchery practices

Jon E. Hess, Andrew P. Matala, Joseph S. Zendt, Chris R. Frederiksen, Bill Sharp, and Shawn R. Narum

Abstract: Major lineages of anadromous salmonids show resilience to natural introgressive hybridization; however, Klickitat River spring-run Chinook salmon (KRSC, *Oncorhynchus tshawytscha*) have an enigmatic origin because of their intermediate genetic and geographic relationship among Columbia River Chinook salmon lineages. We used computer simulations to evaluate four anthropogenic and natural processes as likely causes of the apparent introgressed genetic composition of KRSC: recent admixture (~5 generations), historical admixture (>200 generations), isolation-by-distance gene flow, and natural selection. We also genotyped 2413 fish (32 collections) across 96 single nucleotide polymorphism loci to clarify the relationship of KRSC among the three major Columbia River lineages (Lower Columbia and interior ocean- and stream-types) and to quantify introgression among collections. Between 1980 and 2000, we observed a decline of pure interior stream-type individuals in the KRSC collections. This temporal shift in genetic composition was coincident with relevant changes in hatchery practices. Based on results from the simulations and time-series samples, a recent and anthropogenically caused admixture was most likely responsible for introgression of KRSC. Potential long-term negative effects of introgression may require some form of mitigation.

Hess et al. 2011. Canadian Journal of Fisheries and Aquatic Sciences 68: 1876-1891.

Spring Chinook



Future program

- Integrated program
  - Incorporate greater proportion natural origin fish
- Broodstock collection
  - Lyle Falls Trap
- ~550 Adults
  - 800k on-station release

Conservation benefits

- Increase spawning & rearing distribution
  - Increase abundance
- Increase PNI

Spring Chinook Hatchery Transition Plan:

4 Phased approach:

1. Phase I- Implement collection of NOR adults for new hatchery stock (N_1 line).
   - Collect ~68 Natural origin Adults (NORs) for broodstock
     - 100k smolt release
   - Reduce release number for current hatchery line (H1 line)

2. Phase II- Propagate new hatchery line (H_2 line)
   - Returning adults from N_1 line
   - Terminate propagation of old hatchery line

Spring Chinook Hatchery Transition Plan:

4 Phased approach:

3. Phase III- Complete hatchery stock conversion
   - Old hatchery line completely phased out (H1 line)
   - Increase brood collection for N1 line and new hatchery line (H_1 line)

4. Phase IV- Final increase in production for both N_1 line and H_2 line)
   - Brood take and release of N_1 line will be dependent on strength of Natural Spring Chinook run
   - H_2 line brood take dependent on N_1 line

Klickitat River Spring Chinook: Future Hatchery Program

Program Phase	Broodstock Collection Schedule			
	Brood Year	# N_1 Line Brood	# H_1 Line Brood	# H_2 Line Brood
Phase I	**2018**	68	240	-
	2019	68	240	-
	2020	68	240	-
	2021	68	240	-
	2022	68	240	-
Phase II	**2023**	68	-	240
	2024	68		240
	2025	68		240
	2026	68		240
	2027	68		240
Phase III	**2028**	104		310
	2029	104		310
	2030	104		310
	2031	104		310
	2032	104		310
Phase IV	2033	138		411
	2034	138		411
	2035	138		411
	2036	138		411
	2037	138		411
	2038	138		411

Program Definitions

- N1 Line: Progeny of natural-origin (NOR) parents spawned at Klickitat Hatchery
- H1 Line: Current segregated hatchery line
- H2 Line: Progeny of N1 x N1 or N1 x NOR parents spawned at Klickitat Hatchery

Klickitat River Spring Chinook: Future Hatchery Program

Release year	# N_1 Line Releases	# H_1 Line Release	# H_2 Line Releases	Total Releases
2020	100,000	350,000		450,000
2021	100,000	350,000		450,000
2022	100,000	350,000		450,000
2023	100,000	350,000		450,000
2024	100,000	350,000		450,000
2025	100,000		300-350,000	400-450,000
2026	100,000		300-350,000	400-450,000
2027	100,000		300-350,000	400-450,000
2028	100,000		300-350,000	400-450,000
2029	100,000		300-350,000	400-450,000
2030	150,000		450-500,000	550-600,000
2031	150,000		450-500,000	550-600,000
2032	150,000		450-500,000	550-600,000
2033	150,000		450-500,000	550-600,000
2034	150,000		450-500,000	550-600,000
2035	200,000		600,000	800,000
2036	200,000		600,000	800,000
2037	200,000		600,000	800,000
2038	200,000		600,000	800,000
2039	200,000		600,000	800,000
2040	200,000		600,000	800,000

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Klickitat River Spring Chinook: Future Hatchery Program

Adult Return Schedule			
Return Year	N_1 Line Adults	H_1 Line Adults	H_2 Line Adults
2022	-		-
2023	-		-
2024			-
2025			-
2026			-
2027			-
2028			
2029		Terminated	
2030			
2031			
2032			
2033			
2034			
2035			
2036			
2037			
2038			
2039			
2040			
2041			

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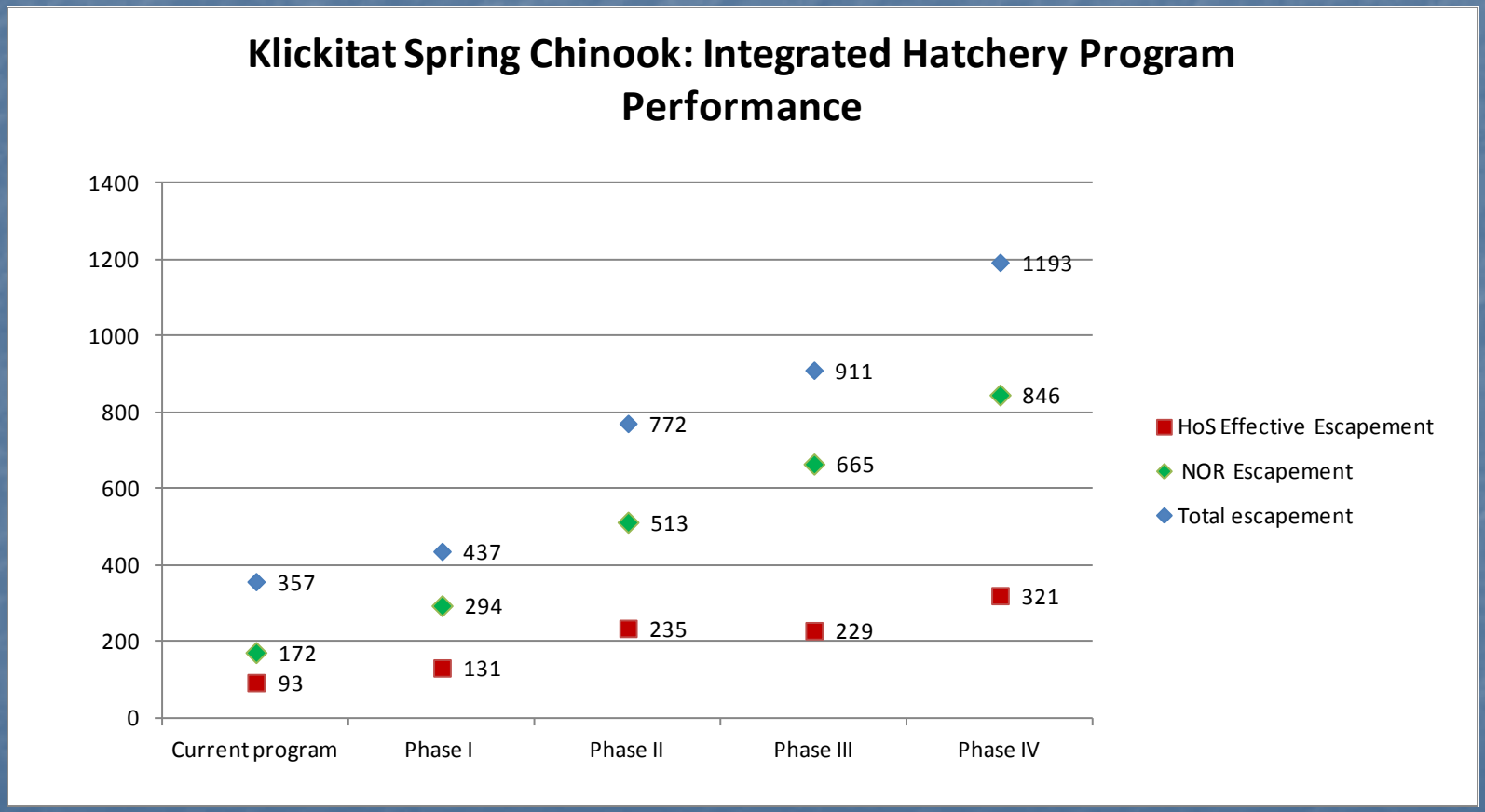
Klickitat Spring Chinook theoretical performance



Independent Scientific Review Panel (2018-10)
"Meets Scientific Review Criteria (Qualified)"

YN to address the following in the upcoming NPCC Category Review covering artificial production projects (November 2020).

1. Performance standards to assess in-hatchery performance, fish health, the proportion tagged, tag retention probability, and the proportion of smolts that mature as mini-jacks.

2. How minijack abundance will be estimated in the three hatchery lines (H1, H2, and N1).

3. Expand description of adaptive management process with contingency plans to include a longer than annual cycle of review (perhaps at 5-year intervals) through which managers will formally consider making **major** changes to the program.

4. Incorporate clarifications, corrections, and new analyses (Appendices A and B) into the Master Plan.

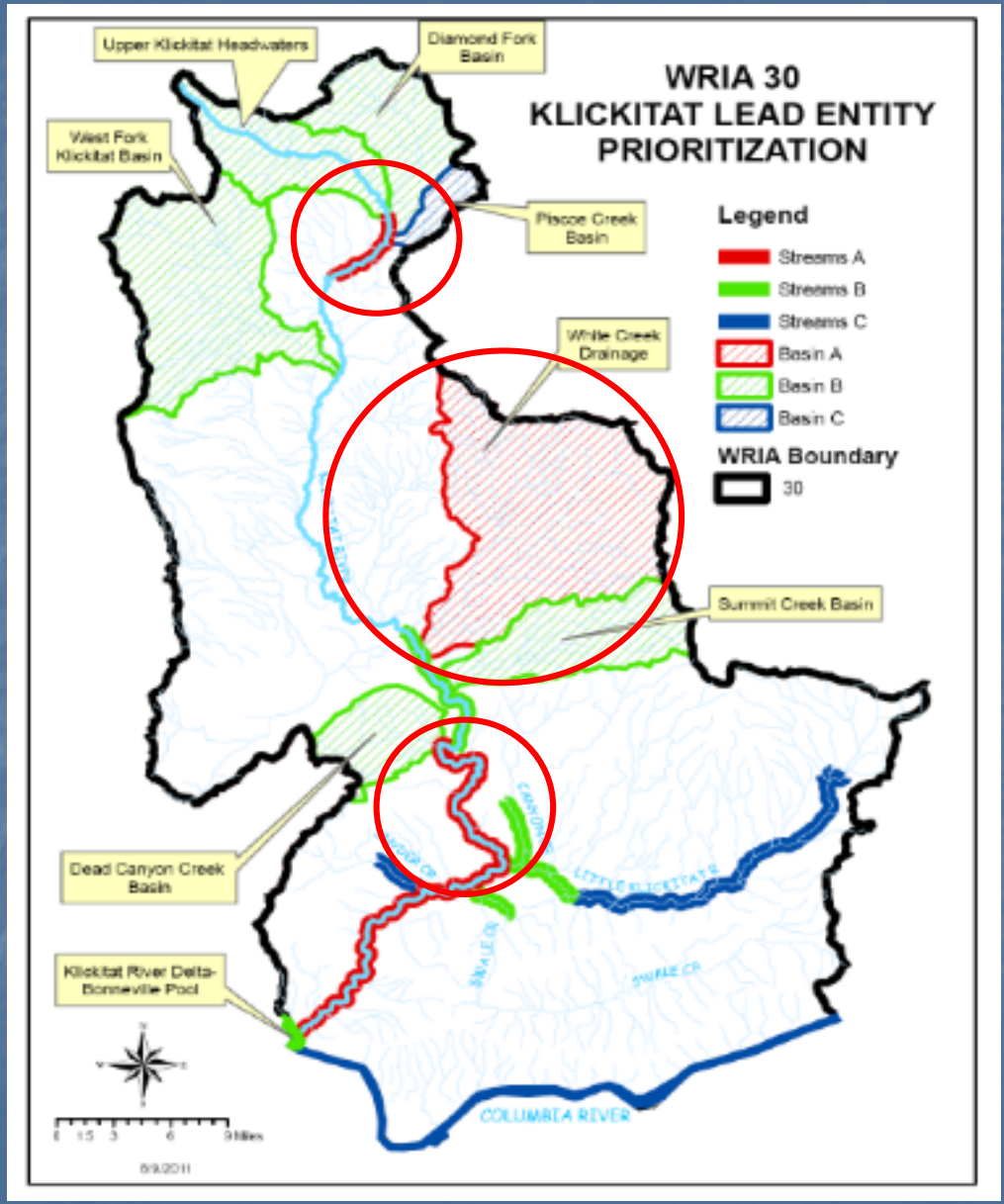
Klickitat Watershed Enhancement Project

Overall goal: restore watershed health to aid recovery of native salmonid stocks in the Klickitat Subbasin.

Link Project Actions to Priority Areas

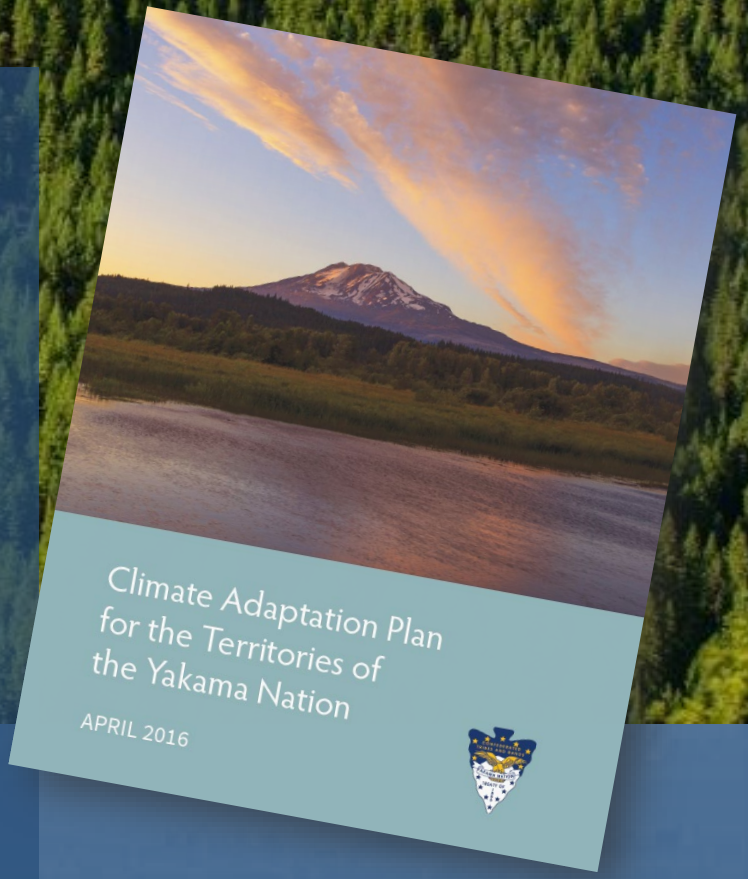
Three-pronged approach:

- Assess watershed and habitat conditions to prioritize actions
- Protect, restore, and enhance priority watersheds and reaches
- Monitor to assess watershed conditions and effectiveness



KWEP Project Types

- Conservation Acquisitions
- Geomorphic & Habitat Assessments
- Passage – longitudinal connectivity (fish, sediment, and wood)
- Forest Roads – drainage improvements, reduce road/river
- Meadows Restoration/Floodplain Reconnection
- Side Channel Reconnection
- Wood Replenishment
- Revegetation
- Livestock Fencing

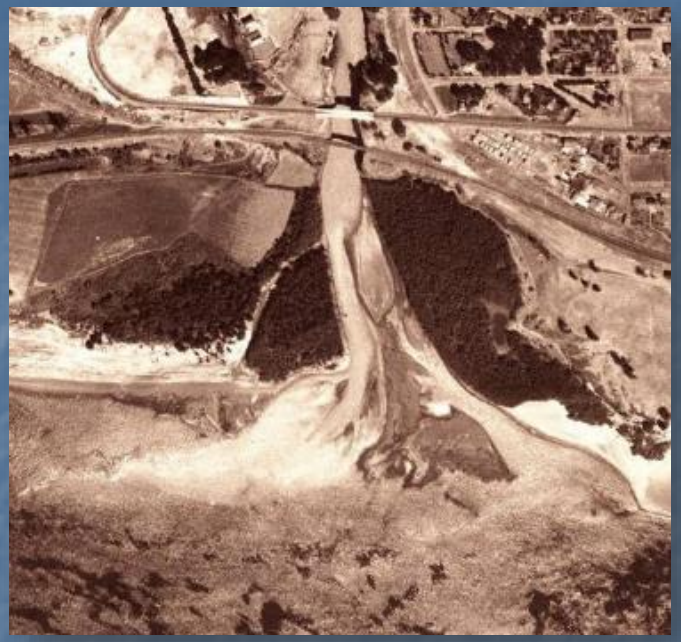


Haul Road Project Accomplishments (Phase 1-6):

- 480 acres of floodplain and associated uplands permanently protected
- 9.2 miles of road removed, pulled back or re-graded
- 1/2 mile of secondary channel constructed
- 1 railroad bridge removed
- 33 acres of asphalt removed along approximately 9 miles of road
- 35 acres of floodplain and off-channel habitat reconnected
- 2 fish-bearing tributaries reconnected and over 46 culverts removed
- Dozens of large woody debris jams constructed
- Tens of thousands of native plants installed on approx. 75 acres

Klickitat Delta/Sediment Fan

- Evaluate opportunities to provide "ecological lift" at tributary deltas.
- Strengthen cold water benefit from tributaries.
- Reduce impacts due to stranding during power ramping events and predation hotspots (avian and piscivorous).
- Evaluate use of dredged material to elevate adjacent shallow bar habitat above ordinary high pool to recreate riparian forest galleries similar to historic conditions.



Klickitat Delta pre-Bonneville Dam

Klickitat Delta/Sediment Fan, 2018

White Salmon River

Questions

ykfp.org/klickitat

Klickitat River Spring Chinook: