In 2008 the Yakama Nation entered into an agreement with the United States, termed the Columbia River Fish Accord, by which we greatly expanded the range and nature of our work to preserve, protect, and restore the fish and wildlife resources that we reserved in perpetuity for future generations in our Treaty of 1855. The health of the water, the fish, and the rivers they need is inseparable from our own health and way of life. While much has occurred over the last 100 years to harm and damage these natural resources, it is our duty to the Creator and to our people to take care of what remains and restore what has been lost.

An elder described this responsibility simply and eloquently as to “Make it the way it was.” This is the vision and goal of our efforts to restore the resources and the places where they live. It is a large and important undertaking, the work of generations, but we will persist and do our part as we are called upon and are able even if it takes the next 100 years. In partnership with others who share our need to protect and restore, we can achieve much.

This report summarizes our progress in restoring fishery resources since signing the 2008 Accord with Bonneville Power Administration, US Army Corps of Engineers, and the US Bureau of Reclamation. We have come a long way and made much progress, but much remains to be done. In this effort we must not fail, for we owe it to our grandchildren and to those yet unborn.

Gerald Lewis
Chairman, Fish and Wildlife Committee
Yakama Nation Tribal Council

OUR MISSION

To honor, protect and restore Nch'i-Wána [the Columbia River], its tributaries and its resources for the benefit of current and future generations of the Yakama people as reserved by them in the Treaty of 1855.*

* Yakama Nation Treaty of 1855 (12 stat. 951) with the United States of America

Cover Photos: Celilo Falls ca. 1930s (Washington Historical Society); Steelhead, BZ Falls White Salmon (Jeanette Burkhardt, YN); Prosser Hatchery (Emily Washines, YN)
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<td>55</td>
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<tr>
<td><strong>Toxics</strong></td>
<td>59</td>
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</tbody>
</table>
Accomplishments by the Yakama Nation during the 2008-2017 Accord

Between 2008 and 2018, the Yakama Nation implemented Accord-funded projects throughout the Tribe’s reservation and Treaty territories to conserve and restore fish populations and their habitat. These efforts have improved the quality and quantity of stream habitats important to the survival and recovery of species that are vital to the Yakama Nation. During this period, the Tribe has seen an increase in the number of fish returning and harvested. Although some improvements have been made, many ecological risks remain that must be addressed before the Tribe’s fish population and harvest goals can be achieved.

1,812 locations
where work was performed

48,693 people
educated and informed

20,000+ coho
record-setting return

258 miles
stream now available to fish
following removal of barriers
108,575 acres
habitat protected/improved

798 miles
riparian habitat protected/improved

66 miles
stream habitat improved/created

105,655 fish
average annual Tribal harvest increase compared to 2000-2007

Source: Accord-funded metrics reported to cbfish.org (7/11/2017), plus Klickitat work with combined SRFB/BPA-funding (rco.wa.gov).
By combining scientific expertise and traditional knowledge, the Yakama Nation has developed projects and partnerships that have restored culturally and economically important fish runs in the Columbia River Basin.

Culturally important fish include:

- Chinook
- Sockeye
- Steelhead
- Coho
- Pacific lamprey
- White sturgeon
Gravel-to-Gravel Management
A holistic guiding principle, gravel-to-gravel management protects and restores fish at all life stages, from an egg deposited in the gravel to the spawner who returns there. It considers all impacts a fish encounters during its lifespan, including habitat conditions, hydrologic challenges, and the influences of hatchery and harvest management. All of these must be taken into account to ensure sustainable populations.

Habitat Restoration
Restoring natural habitats is among the highest priorities for species restoration. Because habitat must be healthy, accessible, and abundant, the Yakama Nation is implementing a broad set of actions to restore streams and watersheds. Habitat restoration benefits all aquatic treaty-trust* fish species of the Yakama Nation, as well as wildlife and other natural resources.

Hatchery/Species Restoration
Human population growth and development have altered flows and habitats resulting in reduced fish productivity. As a result, releases of hatchery and translocated fish are required to: 1) support harvest, 2) re-establish extirpated populations, and 3) supplement naturally spawning populations. The Yakama Nation’s vision for its fisheries utilizes a variety of approaches for maximum long-term restoration benefits.

Harvest Management
The Yakama Nation manages fisheries resources to ensure continued access by Yakama Nation members to fulfill their ceremonial, subsistence, and commercial needs. This treaty-reserved right includes the right to have fish present to harvest at all usual and accustomed places. Our ultimate goal is self-sustaining and abundant fisheries for all species.

* Yakama Nation Treaty of 1855 (12 stat. 951) with the United States of America

Photos above: Some of the Yakama Nation Fisheries staff, guests, and natural resource partners. (Not all staff members present)
The STAR Project provides status and trends information to Tribal leadership, membership, and fisheries management to aid in the development of policy. The project summarizes: 1) trends in the status of priority fish species, 2) species restoration efforts, and 3) hydrosystem and habitat improvements.

**RESOURCES BEING DEVELOPED**

- High-level summaries and interactive online reports
- Interactive mappers
- Custom query reports
- Online dashboard
- Information management system

To learn more about the Yakama Nation Fisheries’ Status and Trends Project and to download this report, please visit [www.yakamafish-nsn.gov/restore/projects/star](http://www.yakamafish-nsn.gov/restore/projects/star).
On May 2, 2008, the Yakama Nation signed the Columbia Basin Fish Accords Memorandum of Agreement providing stable funding for large-scale restoration actions and long-term planning efforts.

**BENEFITS TO THE YAKAMA NATION**
- Expansion of the Tribe’s zone of influence
- Enhanced production and reintroduction
- 10 years of stable and secure funding
- Direct funding of Tribal priorities
- Maintained spill increases at Columbia River dams
- Increased focus on habitat restoration
- Greater tribal representation/collaboration in hydrosystem improvements
- Improved harvest opportunities
Accord-funded Habitat Actions Implemented from 2008 to 2017
### ECOLOGICAL CONCERNS IN THE YAKIMA SUBBASIN

<table>
<thead>
<tr>
<th>Ecological Concern</th>
<th>YN Addressing*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predation**</td>
<td>○</td>
</tr>
<tr>
<td>Temperature</td>
<td>○</td>
</tr>
<tr>
<td>Decreased water quantity</td>
<td>○</td>
</tr>
<tr>
<td>Altered primary productivity**</td>
<td>○</td>
</tr>
<tr>
<td>Floodplain condition</td>
<td>○</td>
</tr>
<tr>
<td>Riparian vegetation</td>
<td>○</td>
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<tr>
<td>Man-made barriers</td>
<td>○</td>
</tr>
<tr>
<td>Large wood recruitment</td>
<td>○</td>
</tr>
<tr>
<td>Bed and channel form</td>
<td>○</td>
</tr>
<tr>
<td>Instream structural complexity</td>
<td>○</td>
</tr>
<tr>
<td>Side channel/wetland conditions</td>
<td>○</td>
</tr>
<tr>
<td>Altered flow timing</td>
<td>○</td>
</tr>
<tr>
<td>Reduced genetic adaptiveness**</td>
<td>○</td>
</tr>
<tr>
<td>Increased sediment quantity</td>
<td>○</td>
</tr>
<tr>
<td>Competition</td>
<td>○</td>
</tr>
</tbody>
</table>

Projects addressing: ☀ Numerous ☀ Many ☀ Some ☀ Not directly

(Rankings relative within this subbasin only)

*Major ECs affecting listed salmonids, as identified in CRITFC PATS local expert evaluation (2015). ECs being addressed by Accord-funded projects as of 07/11/2017, as reported in cbfish.org. EC assignments from BPA, HWS reference, refined by STAR. Additional ECs possibly not listed.

**Predation and genetic adaptiveness being addressed by fisheries projects. Primary productivity indirectly addressed through vegetative restoration.

---

### STREAM FUNCTIONS RESTORED*

Since 2008, the Yakama Nation has completed a number of projects that have restored stream functions to sustain salmon and steelhead in the Yakima Subbasin.

<table>
<thead>
<tr>
<th>Fish Passage</th>
<th>Riparian Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 4 barriers removed</td>
<td>• 66 miles protected (33 miles by fence)</td>
</tr>
<tr>
<td>• 4 barriers improved</td>
<td>• 640 miles improved</td>
</tr>
<tr>
<td>• 122 miles of habitat now accessible</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instream Habitat</th>
<th>Upland Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 230 structures installed</td>
<td>• 4 miles of road blocked/removed/improved</td>
</tr>
<tr>
<td>• 2,550 logs installed (10,000 in progress)</td>
<td>• 9,000+ acres treated/improved</td>
</tr>
<tr>
<td>• 40 miles of stream improved</td>
<td>• 74,500 acres protected</td>
</tr>
<tr>
<td>• 1 mile of dike removed/modified</td>
<td>Water Quality</td>
</tr>
<tr>
<td>• 8 exclusion structures installed</td>
<td>• 4,000 pounds of trash collected</td>
</tr>
<tr>
<td>• 1.75 miles of stream channel created</td>
<td>Water Quantity</td>
</tr>
<tr>
<td></td>
<td>• 2 alternative sources identified</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wetland Habitat</th>
<th>Outreach</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1,330 acres protected</td>
<td>• 22,700 people contacted</td>
</tr>
<tr>
<td>• 4,000 acres improved</td>
<td></td>
</tr>
</tbody>
</table>

*BPA-funded metrics reported to cbfish.org 1/1/2008-07/11/2017
**Yakama Reservation Watershed Project—Toppenish Creek Restoration River Mile 37**

**Fish Present:** Steelhead and coho

**Problem:** Lack of off-channel habitat, spawning gravels, and cover. Past actions resulted in increased temperature, turbidity, channel incision/instability, and loss of floodplain connections and wetlands.

**Restoration Actions:**
- Installed engineered log jams and debris-catching structures
- Increased instream complexity
- Sloped unstable banks and replanted with native vegetation
- Reconnected .25 miles of side channel

**Benefits**
- Channel bed buildup
- Floodplain connection
- Riparian development
- 4 barriers removed
- Groundwater storage improved
- Trap and sort spawning substrates and wood
- Instream velocity slowed to reduce scour

---

**South Fork Cowiche Creek Floodplain Restoration***

**Fish Present:** Steelhead, Chinook, and coho

**Problem:** Past actions resulted in an incised channel disconnected from its floodplain, bank erosion, and lack of instream habitat and off-channel habitat.

**Restoration Actions:**
- 1,400 logs and root wads installed in more than 2 miles of stream channel (trees from Oak Creek thinning) and planted native vegetation

**Benefits**
- Floodplain inundated during high flows recharges groundwater and improves summer flows
- Reduced flood risk downstream
- Encourage regrowth of native riparian vegetation that provides shade and sustains complexity

* non-BPA funded project (SFB and BLM cost-share)
Taneum Creek Wood Replenishment

**Fish Present:** Steelhead

**Problem:** Past actions resulted in depleted instream complexity, floodplain disconnection, and bank erosion. Water storage capacity has been reduced leading to flashy flows, downstream flooding, and reduced low flows.

**Restoration Actions:**
- 800 trees with root wads placed along 7 miles of stream (trees obtained by thinning nearby forests) to improve habitat complexity

**Benefits:**
- Flows slowed
- Erosion reduced
- Sediments and debris allowed to collect and build streambed
- Flows sustained longer as water is provided a chance to soak into the ground
- 3 miles of side channels have naturally developed
- Thinning forest reduce catastrophic fire risk

---

Teanaway Community Forest Aquatic Restoration*

**Fish Present:** Steelhead

**Problem:** Past activities depleted habitat complexity, disconnected streams from their floodplains leading to reduced water storage and instream habitats, as well as warmer stream temperatures.

**Restoration Actions:**
- 13,700 logs and 1,300 rootwads placed along 9 miles of Indian, Middle, Dickey, Jungle, Rye, Lick, Carlson and First creeks to restore stream habitats and watershed function.

**Benefits:**
- Improved water supply by restoring groundwater/floodplain connectivity and storage
- Improved instream and side channel complexity
- Retention of substrates, building up degraded channels
- Improved bank stability
- Reduced water temperatures through potential pool development, increased cover and shading

---

* Funded by American Rivers, BPA, NOAA and USFWS
Accord-funded Production Actions Implemented from 2008 to 2017

Legend
- Acclimation
- Fish health
- Produce hatchery fish
- Reintroduction
- Kelt reconditioning
- Supplementation
- Trap/transport
- RME (fish)
- O&M
- Outreach/Education

Not Shown:
Pre-work, Planning, Reporting, species related habitat work.

Accord funded actions as of 7/11/2017 as reported at cbfish.org.
Many sites overlapping, all may not be visible.

Sources: Esi, USGS, NOAA
YAKAMA NATION HATCHERIES IN THE YAKIMA SUBBASIN

**Prosser Tribal Hatchery**

**Fish:** Fall and summer Chinook, Pacific lamprey, steelhead (kelt reconditioning), and coho

**Goals:** Increased harvest, natural spawning, abundance, and distribution

---

**Levi George Cle Elum Supplementation and Research Facility**

**Fish:** Spring Chinook

**Goals:** Enhance returns and provide fishing opportunities

**Research:** Production and rearing techniques

---

**Marion Drain Hatchery**

**Fish:** Summer Chinook and white sturgeon

**Goals:** Self-sustaining, locally adapted summer Chinook above Prosser. Enhance white sturgeon through wild-origin juvenile stocking (see page 17).

---

In addition to the projects listed above, the Yakama Nation is reintroducing sockeye to Lake Cle Elum and is developing a coho hatchery. See page 16 for more information.
Steelhead Kelt Reconditioning

**Background:** Reconditioned kelts have the potential to increase productivity of natural populations and represent an important life history for steelhead. Since 1999, the Yakama Nation has been developing strategies to recondition kelts for repeat spawning potential. Natural fish that have spawned are captured, held, and fed in an artificial environment. After release, fish are tracked to determine reproductive potential.

**Goals:** Increase productivity of natural populations and maintain life history.

**Results:**
- 4,042 reconditioned kelts have been released in the Yakima Subbasin
- Reconditioned kelts are reproducing in the wild and are similarly successful as natural kelts
- Population is trending upwards relative to other Columbia Basin steelhead populations

Steelhead kelt at Prosser Hatchery.

(Emily Washines, YN)
REINTRODUCTION PROJECTS

Cle Elum Sockeye*
Cle Elum Dam was built in 1993 and lacked fish passage causing sockeye to be extirpated as they could not reach their spawning grounds. In 2009 sockeye were reintroduced into Lake Cle Elum.
- 2013: First sockeye returns to spawn
- 2016: 3,742 sockeye passed Prosser

Yakima Sockeye Adults Prosser Dam Counts

Yakima Basin Coho
Because coho were extirpated from the Yakima Basin in the early 1980s, a reintroduction program was initiated in 1985 at the Prosser Hatchery, and now a new hatchery is being built near Ellensburg.
- 2016: 461,000 smolts produced
- 2018: Construction starts on hatchery that can produce 700,000 smolts

Adult Coho Counts at Prosser Dam

*Sockeye reintroduction funded by NOAA’s PCSRF fund, U.S. BOR, and Grant County PUD.
WHITE STURGEON MANAGEMENT PROJECT

Background: Since the 1990s, the Yakama Nation has been researching how to culture white sturgeon by rearing small numbers in Tribal hatchery facilities. In 2017, 12 adults were collected from the Columbia River for spawning.

Goals: Healthy populations that provide harvest opportunities in the mid-Columbia and Lower Snake rivers; Enhanced natural spawning and fisheries.

Results:
- Spawning/rearing sturgeon since 2007
- Since 2010, wild-origin juveniles have been released into Priest Rapids, Wanapum, and Rocky Reach reservoirs, as well as Zone 6.

Note: Sturgeon production/reintroduction projects receive some funding from non-Accord sources (e.g., NOAA’s PCSRF program, the U.S. BOR, and Grant, Chelan and Douglas County PUDs).
PACIFIC LAMPREY PROJECT

Background: Of significant cultural and ecologic value, Pacific lamprey have declined throughout their range. Since 2009, the Yakama Nation has been restoring lamprey throughout the reservation and Tribal territories.

Activities include:
- Adult lamprey reintroduction/supplementation in Yakima, Wenatchee, Methow subbasins, and mainstem Upper Columbia
- Documentation of distribution, migration, and restoration results
- Addressing larval and juvenile lamprey entrainment and stranding, salvaging ~40,000 fish per year
- Adult passage improvement and effectiveness monitoring
- Development of artificial production techniques
- Outreach, education, cultural documentation, and partnership building

2017 Highlights:
- Documented increased distribution and abundance in all translocation subbasins
- Transported 1,238 adults from Lower Columbia Dams (average ~1,000/yr)
- Discovered western brook lamprey in the Upper Columbia
- Placed two adult lamprey passage structures at Prosser Dam
- 561 adults counted at Prosser Dam in 2017, more than 10 times previous counts

Note: Translocation and surveys Accord-funded. Other work supported by Bureau of Reclamation and Public Utility Districts.

Source: YN (ykfp.org/docsindex.htm)
By the 1970s and 1980s, all of the Yakima River salmonid stocks were either extirpated or severely depressed. Summer-run Chinook were extirpated from the Yakima Basin by 1970, while coho were declining until they were gone by the early 1980s. By the 1980s and 1990s, adult spring Chinook and steelhead returns were less than 3,500 and 1,000, respectively. To restore these culturally and economically important species, the Yakama Nation is applying a combination of habitat restoration and hatchery supplementation/reintroduction efforts to restore the ecosystem with sustainable and harvestable populations of salmonids and other at-risk species.*

### Steelhead
- **Returns:** Returns increased by 2,444 fish per year (annual average) 2008-2016 versus 1999-2007
- **Redd counts:** Increased somewhat through the Accord period
- **Wild smolt-to-adult index 2002-2013:** 4.67% (average, McNary-McNary)

### Summer Chinook
- **Extirpated from the Yakima Subbasin by 1970**
- **Reintroduced with Yakama Nation juvenile releases starting in 2009**
- **Goal:** Self-sustaining locally-adapted population contributing to the fishery

---

Spring Chinook

- **Returns**: Although not as high during the Accord period as in the early 2000s, annual increases have been observed.

- **Redd counts**: Lower during the Accord period than in the early 2000s; however, spatial distribution increased in underutilized habitat; Wild smolt-to-adult Index 2002-2013 is 2.37% (average, McNary-McNary).

- **Harvest**: On average, significantly increased starting in 2000 compared to the 1990s.

Fall Chinook

- **Escapement**: Greater in 2002, 2014, and 2015 than any previously recorded year (above Prosser Dam).

- **Spatial distribution**: Increasing for spawners throughout the Yakima Subbasin.

- **Harvest**: Contributing substantially to Zone 6 Treaty fisheries as well as the ocean and lower Columbia River fisheries.

*See page 16 for Yakima Subbasin sockeye and coho information.*
Accord-funded Habitat Actions Implemented from 2008 to 2017

Legend
- Channel complexity, floodplain
- Habitat complexity/ stability
- Passage improvement
- Revegetate
- Road improvement
- Habitat protection
- Habitat O&M
- Habitat RME
- Outreach/ education
- Not shown: Pre-work, planning, reporting

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible.

Sources: Esri, USGS, NOAA
ECOLOGICAL CONCERNS IN THE KLICKITAT SUBBASIN

<table>
<thead>
<tr>
<th>Ecological Concern</th>
<th>YN Addressing*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instream structural complexity</td>
<td>Yes</td>
</tr>
<tr>
<td>Bed and channel form</td>
<td>Yes</td>
</tr>
<tr>
<td>Floodplain condition</td>
<td>Yes</td>
</tr>
<tr>
<td>Riparian vegetation</td>
<td>Yes</td>
</tr>
<tr>
<td>Large wood recruitment</td>
<td>Yes</td>
</tr>
<tr>
<td>Decreased water quantity</td>
<td>Yes</td>
</tr>
<tr>
<td>Altered flow timing</td>
<td>Yes</td>
</tr>
<tr>
<td>Altered primary productivity**</td>
<td>No</td>
</tr>
<tr>
<td>Competition</td>
<td>No</td>
</tr>
<tr>
<td>Side channel/ wetland conditions</td>
<td>No</td>
</tr>
<tr>
<td>Temperature</td>
<td>No</td>
</tr>
<tr>
<td>Man-made barriers</td>
<td>No</td>
</tr>
<tr>
<td>Increased sediment quantity</td>
<td>Yes</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Projects addressing: 
- Numerous: 8
- Many: 0
- Some: 0
- Not directly: 0

*(Rankings relative within this subbasin only)*

*Major ECs affecting listed salmonids, as identified in CRITFC PATS local expert evaluation (2015). ECs being addressed by Accord-funded projects as of 07/11/2017, as reported in cbfish.org. EC assignments from BPA, HWS reference, refined by STAR. Additional ECs possibly not listed. **Primary productivity indirectly addressed through vegetative restoration.

STREAM FUNCTIONS RESTORED

Since 2008, the Yakama Nation has completed a number of projects that have restored stream functions to sustain salmon and steelhead in the Klickitat Subbasin.

Fish Passage
- 8 fish passage barriers removed
- 132 miles of habitat now accessible

Instream Habitat
- 120 structures installed as well as 40 individual logs
- 58 pools created
- 11 miles of stream treated for channel reconfiguration and connectivity
- 2 exclusion devices installed to protect habitat

Riparian Habitat
- 2 miles protected by fencing
- 63 miles improved by vegetative treatments

Upland Habitat
- 0.75 miles of road blocked/removed/improved
- 53 acres treated/improved

Outreach
- 8,500 people contacted

*BPA-funded metrics reported to cbfish.org 1/1/2008-07/11/2017. Note: Numbers include work conducted since 2008 with work with combined SRFB/BPA-funding (rco.wa.gov).
Haul Road Restoration (2014-2016 Update, Phases 4-6)

Fish Present: Summer and winter steelhead, spring and fall Chinook, and coho

Problem: Critical spawning/rearing/migration habitat in which a legacy road confines the river into a straight channel and impedes access to side channels, recruitment of sediments/gravel/wood, and establishment of riparian vegetation.

Restoration Actions:
- 8 miles of road are being removed so the river can access the floodplain
- 9,500 native plants installed
- 45 pieces of large wood placed in side channels and backwaters
- 14 culverts removed
- 20 acres of riparian/floodplain now accessible

Benefits
- Restored stream processes
- Reduced habitat fragmentation
- Restored habitat complexity and floodplain/side channel connection
- Increased habitat quantity and diversity
- Sustained wood inputs

Fish Present: Steelhead

Problem: Representing some of the most important rearing habitat for steelhead in the subbasin, land-uses have downcut the creek by 3 to 5 feet resulting in a disconnection with the floodplain. Fish become stranded in the creek as it becomes dewatered from September through October.

Restoration Actions:
• Constructed riffles to build-up streambed
• Installed wood (harvested on-site) to prevent lateral erosion, enhance pool habitat, and slow flows
• Meadow revegetated with shrubs, grasses, and forbes
• 0.7 miles of stream reconnected with its floodplain
• 0.4 miles of historic channel reactivated

Benefits
• Improved in-channel habitat for spawning and rearing
• Meadow restored to promote traditional medicinal and food plants
• Late-season flows extended by raising water table and floodplain storage
Accord-funded Production Actions Implemented from 2008 to 2017

Legend
- Ecological Studies
- Spawning Survey
- Population Studies
- Genetic Study
- Trap Counts
- Tagging, Tracking, Ageing
- O&M
- Outreach/ Education

Not Shown:
Pre-work, Planning, Reporting, species project habitat work.

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible.

Sources: Esri, USGS, NOAA
In 2006, the Yakama Nation assumed responsibility for the operation of Klickitat Hatchery and the Lyle and Castle falls fishways through Mitchell Act funds. Fish released from the hatchery are mitigation for lost harvest opportunities resulting from hydrosystem development and operations.

Fish: Spring/fall Chinook and coho

Goals: Re-establish, supplement, and/or increase natural production and harvest opportunities while maintaining long-term fitness of the target populations and limiting/avoiding impacts on non-target species.

* Production efforts are Mitchell Act-funded, not Accord-funded

Yakama Tribal member fishing in the Klickitat River for fall Chinook salmon (Photo: Ryan Hagerty, USFWS)
In the 1950s, an average of 2,523 spring Chinook (adults and jacks) returned annually to the Klickitat Subbasin; however, from 1977 to 2003 returns decreased to an average of 1,900 adult fish annually (includes hatchery-origin fish). The Klickitat Subbasin supports native winter and summer steelhead and historically provided a significant steelhead fishery. From 1987 to 2003, the average escapement of steelhead (winter and summer) was fewer than 300 fish (wild and hatchery). To restore these species, the Yakama Nation is restoring habitat and conducting research and monitoring of steelhead populations to evaluate the need for hatchery supplementation/reintroduction. Coho and fall Chinook are produced to mitigate for lost harvest opportunities, while limiting/avoiding impacts on non-target species.

**Steelhead**

- Spatially diverse population spawning throughout the lower and middle sections of the Klickitat Subbasin
- Majority of adult Skamania Hatchery fish returning from Klickitat River smolt releases do not appear to spawn in the wild
- Research into species status and needs, as well as priority habitat restoration for Rock Creek steelhead, is currently underway
- 94,500 smolts released in 2015 by WDFW (Non-Accord funded)

**Coho**

- Yakama Nation releases 1 million coho/year (combined with WDFW, 9.5 million released since 2008)
Spring Chinook
- Most spawning occurs in the upper middle Klickitat River
- Recolonization slow above Castile Falls
- 5.1 million smolts (570,248/year average) released since 2008

Fall Chinook
- Population sustained by hatchery production with most spawning occurring from the Klickitat Hatchery downstream to Twin Bridges
- Returns in recent years have been strong
- 30.8 million smolts (3.4 million/year average) released since 2008
- On average, 12,655 more fall Chinook harvested annually 2008-2015 versus 2000-2007

Wild Spring Chinook Escapement Estimate

Klickitat Fall Chinook Harvest (Sport and Tribal)
Source: YN. 2015 data preliminary. (Source YN, personal communication)

Fall Chinook Escapement Estimate
Expanded counts based on spawners plus carcasses, although visibility poor. Source: YN (Joe Zendt, personal communication)
Accord-funded Habitat Actions Implemented from 2008 to 2017

Legend
- Revegetate
- Water quantity
- Habitat protection
- Habitat O&M
- Habitat RME
- Outreach/ education

Not shown: Pre-work, planning, reporting

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible.

Sources: Ent, USGS, NOAA
ECOLOGICAL CONCERNS IN THE ROCK CREEK SUBBASIN

<table>
<thead>
<tr>
<th>Ecological Concern</th>
<th>YN Addressing*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased water quantity</td>
<td></td>
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<tr>
<td>Altered flow timing</td>
<td></td>
</tr>
<tr>
<td>Instream structural complexity**</td>
<td></td>
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<td>Bed and channel form</td>
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<td>Riparian vegetation</td>
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<td>Floodplain condition</td>
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<td>Side channel/wetland conditions</td>
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<td>Temperature</td>
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<td>Competition</td>
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<td>Altered primary productivity</td>
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<tr>
<td>Oxygen</td>
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<td>Turbidity</td>
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<tr>
<td>Increased sediment quantity</td>
<td></td>
</tr>
<tr>
<td>Toxic contaminants**</td>
<td></td>
</tr>
</tbody>
</table>

Projects addressing: Numerous Many Some Not directly

(Rankings relative within this subbasin only)

*Major ECs affecting listed salmonids, as identified in CRITFC PATS local expert evaluation (2015). ECs being addressed by Accord-funded projects as of 07/11/2017, as reported in cbfish.org. EC assignments from BPA, HWS reference, refined by STAR. Additional ECs possibly not listed.

**Instream complexity indirectly addressed through LWD recruitment. Toxics indirectly addressed through outreach.

STREAM FUNCTIONS RESTORED

Since 2008, the Yakama Nation has completed a number of projects that have restored stream functions to sustain salmon and steelhead in the Rock Creek Subbasin

<table>
<thead>
<tr>
<th>Wetland Habitat</th>
<th>Upland Habitat</th>
<th>Outreach</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 acres improved</td>
<td>24 acres of vegetation maintained</td>
<td>540 people contacted</td>
</tr>
<tr>
<td>Riparian Habitat</td>
<td>14 acres treated/improved</td>
<td></td>
</tr>
<tr>
<td>15 miles treated/improved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 acres improved</td>
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</table>

Steelhead Status Update

Historically, steelhead runs occurred in Rock Creek; however, by the 1990s the population had become depressed.

- Recent estimates indicate the population’s 12-year average is > the Minimum Viability Abundance Threshold

Continuing surveys of population distribution, abundance, movement, relatedness with other populations, and habitat conditions will inform the implementation of the most effective restoration strategies.

Rock Creek Steelhead Abundance Estimate*  

*Poor visibility can lead to underestimates. Based on raw redd count x 2.5. Source: YN
**Condit Dam Removal and Recovery**

**Background**
- Located 3.3 river miles upstream of the Columbia River confluence
- Built in 1913 — barrier to migratory fishes
- Important ancestral area — Yakama Nation advocated removal for two decades
- Breached October 2011 — removal completed September 2012
- Among the largest dams removed in the U.S.

**Fish Recolonization**
- 5-15 miles of spawning habitat accessed for spring and fall Chinook, 33 miles for steelhead
- Fish recolonizing naturally
- Salmon and steelhead accessed habitat the spring following breaching
- Steelhead and spring/tule/bright fall Chinook observed spawning in the accessed habitat
- Juvenile anadromous salmonids observed in accessed area
- Pacific lamprey documented in the accessed area
- Tribal harvest currently closed to allow for recolonization

*Not an Accord-funded project; however, included because of significance to the Yakama Nation.*

Condit Dam Removal (Photo: Andy Maser)
Habitat Restoration of the Former Reservoir

**Problem:** A large amount of sediment accumulated in the reservoir during the 99 years of impoundment.

**Objective:** Ecological restoration, community involvement, and re-establish culturally important species.

**Actions:**
- Grade accumulated sediment
- Plant native vegetation

**Results:**
- Landscape stabilized through grading
- Planted more than 7400 native plants (34 species) with over 500 volunteers assisting
- The Yakama Nation and Mid-Columbia Fisheries Enhancement Group planted 3 acres with native vegetation (PacifiCorp revegetated the remaining 57 acres)

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Restoration of the River Mouth - Scheduled Start Date Winter 2017/18

**Problem:** Sedimentation filled the boat basin following the removal of Condit Dam restricting access to the Underwood In-Lieu site.

**Objective:** Reduce shallow water habitat and restore access to the Underwood In-Lieu Site.

**Actions:**
- Sediment that filled the boat basin will be removed in the winter of 2017/18 and used to develop riparian islands

**Anticipated Results:**
- Gain access to boat basin
- Reduction of shallow warm-water habitat at the mouth of the White Salmon River, greatly reducing stranding of juvenile salmonids and lamprey during Bonneville pool fluctuations.
Accord-funded Habitat Actions Implemented from 2008 to 2017

Legend:
- Channel complexity, floodplain
- Habitat complexity/stability
- Passage Improvement
- Revegetate
- Enhance Nutrients
- Water quantity
- Habitat protection
- Habitat O&M
- Passage O&M
- Habitat RME
- Outreach/education

Not shown: Pre-work, planning, reporting

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible.
Source: BSR, VCE, NOAA
Since 2008, the Yakama Nation has completed a number of projects that have restored stream functions to sustain salmon and steelhead in the Wenatchee Subbasin.

**Fish Passage**
- 0.5 miles of habitat now accessible

**Wetland Habitat**
- 2.8 acres improved

**Outreach**
- 3,700 people contacted

**Water Quantity**
- 28 miles of stream with improved water management
- 70 cfs of flow kept instream

**Riparian Habitat**
- 5.2 miles improved

**Water Quality**
- 7,200 pounds of nutrients added to 70 miles of stream

**Instream Habitat**
- 84 structures installed
- 23 pools created
- 3.4 miles of stream improved
- 0.25 miles of stream channel created

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**ECOLOGICAL CONCERNS IN THE WENATCHEE SUBBASIN**

<table>
<thead>
<tr>
<th>Ecological Concern</th>
<th>YN Addressing*</th>
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<tbody>
<tr>
<td>Altered primary productivity</td>
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<tr>
<td>Instream structural complexity</td>
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<tr>
<td>Side channel/wetland conditions</td>
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<tr>
<td>Man-made barriers</td>
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<tr>
<td>Bed and channel form</td>
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<tr>
<td>Decreased water quantity</td>
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<tr>
<td>Temperature</td>
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</tr>
<tr>
<td>Mechanical injury</td>
<td>☐</td>
</tr>
</tbody>
</table>

Projects addressing: ☒ Numerous ☒ Many ☒ Some ☐ Not directly
(Rankings relative within this subbasin only)

*Major ECs affecting listed salmonids, as identified in CRITFC PATS local expert evaluation (2015). ECs being addressed by Accord-funded projects as of 07/11/2017, as reported in cbfish.org. EC assignments from BPA, HWS reference, refined by STAR. Additional ECs possibly not listed.

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Metrics reported to cbfish.org as of 07/11/2017
Accord-funded Production Actions Implemented from 2008 to 2017

Legend
- Acclimation
- Fish health
- Produce hatchery fish
- Trap/transport
- RME (fish)
- O&M
- Outreach/Education

Not Shown: Pre-work, Planning, Reporting, species project habitat work.

Accord funded actions reported as of 7/11/2017 at cdbifish.org
Many sites overlapping, all may not be visible.

Sources: Esri, USGS, NOAA
REINTRODUCTION OF COHO

Coho were extirpated from the middle reach of the Columbia River in the early-1990s. The reintroduction of coho in the middle and upper Columbia River Basin has been dependent on releases of hatchery-origin coho. The Yakama Nation’s reintroduction program initially depended on broodfish from the lower Columbia River; however, the program now only uses in-basin, locally adapted broodstock. To help restore steelhead production, the Yakama Nation has participated in research on the fidelity of smolts to areas where they can return as adults and rebuild naturally spawning populations.
During the pre-treaty era, salmonids were abundant in the Wenatchee Subbasin; however, exploitation and habitat degradation depleted the runs. Spring Chinook redd counts have fluctuated since the 1950s. From 1958 to 2002, the spring Chinook redd count average and escapement estimate were 560 and 1,200, respectively. Decadal counts for summer steelhead have fluctuated since the 1930s, with a significant increase observed in the early-2000s.* Decadal averages of summer Chinook returns from the 1930s through 2002 indicate an increasing trend. Coho, extirpated in the early-1900s, have recently been reintroduced by the Yakama Nation. Natural reproduction is now occurring in the subbasin.

* Icicle Creek steelhead originally hatchery-origin and are not ESA-listed

**Spring Chinook Escapement Estimate, Natural and Hatchery**

- Peshastin
- Icicle
- Upper Wenatchee
- White
- Little Wenatchee
- Nason
- Chiwawa

**Spring Chinook**
- Average 655 more spawners per year, 2008-2016 versus 1999-2007
- Hatchery releases are CPUD/USFWS/WDFW mitigation and supplementation efforts
- Yakama Nation will be assisting with experimental acclimation to improve homing to areas of better habitat quality

**Summer Chinook**
- Purpose of CPUD hatchery releases is for increased harvest opportunity
- Hatchery returns segregated from natural tributary spawning populations

Coho
- Yakama Nation began reintroducing in 1999
- Average annual estimated run size is 3,114 fish (2008-2016)
- 908,000 smolts released per year (average 2008-2015)

Summer Steelhead
- Steady returns, with annual fluctuations, since 2002
- Most hatchery releases are CPUD-funded
- Yakama Nation, with CPUD and WDFW, has participated in Accord-funded research on improved homing

Based on Tumwater Dam counts, redd counts below the dam, and broodstock collected (except 2002-2003 are Dryden Dan counts). Source: Ishida et al. 2016. Mid-Columbia Coho Reintroduction Feasibility Study. BPA Project # 1996-040-00 (cbfish.org)

Coho Escapement Estimate, Natural and Hatchery

Steelhead Escapement Estimate, Natural and Hatchery

Accord-funded Habitat Actions Implemented from 2008 to 2017

Legend
- Channel complexity, floodplain
- Habitat complexity/ stability
- Passage improvement
- Habitat O&M
- Habitat RME
- Outreach/ education

Not shown: Pre-work, planning, reporting

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible.

Sources: Esri, USGS, NOAA
ECOLOGICAL CONCERNS IN THE ENTIAT SUBBASIN

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Projects addressing:  ● Numerous  ○ Many  ○ Some  ○ Not directly
(Rankings relative to this subbasin only)

*Major ECs affecting listed salmonids, as identified in CRITFC PATS local expert evaluation (2015). ECs being addressed by Accord-funded projects as of 07/11/2017, as reported in cbfish.org. EC assignments from BPA, HWS reference, refined by STAR. Additional ECs possibly not listed.

**Altered flow timing shown here, a related issue. Altered primary productivity indirectly addressed through vegetative restoration.

STREAM FUNCTIONS RESTORED

Since 2008, the Yakama Nation has completed a number of projects that have restored stream functions to sustain salmon and steelhead in the Entiat Subbasin.

**Fish Passage**
- 1 fish passage barrier removed
- 1 mile of habitat now accessible

**Outreach**
- 16,500 people contacted

**Upland Habitat**
- 1.5 acres treated/improved

**Riparian Habitat**
- 3.25 miles improved

**Instream Habitat**
- 28 log/rootwad structures installed
- 300 boulder structures installed
- 3.25 miles of stream improved

*BPA-funded metrics reported to cbfish.org 1/1/2008 - 07/11/2017
Salmon and steelhead were abundant in the Entiat Subbasin during the pre-development period; however, resource exploitation depleted runs and in some cases led to their extirpation. Between 1992 and 2002, the long-term averages for redd counts and escapement were 110 and 215, respectively, for spring Chinook in the Entiat Subbasin. For summer/fall Chinook, an average of 75 redds were observed annually between 1994 and 2002.

**Spring Chinook**
- Average spawning escapement during the Accord period was 95 more fish annually than for the years between 2002 and 2007
- No juvenile hatchery supplementation since 2008

**Summer Chinook**

- Not considered native to the Entiat
- With no releases since 1976, releases were reinitiated in 2011
- Raised at Entiat National Fish Hatchery, the purpose of CPUD/USFWS/WDFW hatchery releases are for increased harvest opportunity
- Hatchery returns are segregated from natural tributary spawning populations

**Summer Steelhead**

- 74 more natural spawners per year on average 2008-2016 versus 1999-2007
- Hatchery releases are a DPUD/WDFW/USFWS effort based out of Winthrop National Fish Hatchery

---

**Natural-Origin Steelhead Spawning Escapement Estimate**

- Based on Priest Raps minus Wells Dam counts, harvest, pre-spawn mortality and broodstock removed. Apportioned by radio telemetry studies. Source: WDFW (fortress.wa.gov)

**Summer Chinook Escapement Estimate, Natural and Hatchery**

- Based on index and expanded reach redd counts. Source: Fraser, G. And C. Hamstreet 2017. Chinook Salmon spawning ground surveys on the Entiat River, 2016. (www.fws.gov)
Accord-funded Habitat Actions Implemented from 2008 to 2017

Legend
- Channel complexity, floodplain
- Habitat complexity/stability
- Passage improvement
- Revegetate
- Road improvement
- Enhance nutrients
- Water quantity
- Habitat protection
- Habitat O&M
- Passage O&M
- Habitat RME
- Outreach/education

Not shown: Pre-work, planning, reporting

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible.

Sources: Esri, USGS, NOAA
Since 2008, the Yakama Nation has completed a number of projects that have restored stream functions to sustain salmon and steelhead in the Methow Subbasin.

**STREAM FUNCTIONS RESTORED**

**Fish Passage**
- 2 miles of habitat now accessible

**Upland Habitat**
- 25 acres treated/improved
- 166 acres protected

**Wetland Habitat**
- 168.2 acres protected

**Water Quality**
- 1,500 pounds of trash collected
- 17,000 pounds of nutrients added to 85 miles of streams

**Water Quantity**
- 267 acre/feet water kept instream

**Riparian Habitat**
- 8.8 miles protected
- 4.5 miles improved
- 30 terrestrial structures installed

**Instream Habitat**
- 31 structures installed
- 17 logs installed
- 17 pools created
- 4.7 miles of stream improved
- 6 exclusion structures installed
- 161 beavers released
- 1.76 miles of stream channel created

**Outreach**
- 1,100 people contacted

*Major ECs affecting listed salmonids, as identified in CRITFC PATS local expert evaluation (2015). ECs being addressed by Accord-funded projects as of 07/11/2017, as reported in cbfish.org. EC assignments from BPA, HWS reference, refined by STAR. Additional ECs possibly not listed.*
Accord-funded Production Actions Implemented from 2008 to 2017

Legend
- ▼ Acclimation
- ○ Fish health
- ▲ Produce hatchery fish
- ▶ Kelt reconditioning
- ● Trap/ transport
- × RME (fish)
- ○ O&M
- ○ Outreach/ Education

Not Shown:
- Pre-work, Planning, Reporting, species project habitat work.

Accord funded actions reported as of 7/11/2017 at cbfish.org
Many sites overlapping, all may not be visible

Sources: Esri, USGS, NOAA
YAKAMA NATION PRODUCTION IN THE METHOW SUBBASIN

KELT RECONDITIONING

Of the salmonids in the subbasin, steelhead are unique in that they possess the ability to repeat spawn. The artificial reconditioning of post-spawn steelhead (kelts) is important as upper Columbia River steelhead experience high mortality rates. The Yakama Nation initiated a kelt reconditioning project in 2012 to test whether the abundance of naturally-produced upper Columbia River steelhead can be increased through the use of long-term kelt reconditioning methods. In addition, coho are being reintroduced into the subbasin by the Yakama Nation with a goal of establishing naturally spawning populations.
Industrial development of the Columbia River, agricultural, forestry, and private development of the Methow Subbasin, combined with historically intensive fishing, have led to declines of wild salmonid populations. By the 1930s, only 200 to 400 adult spring Chinook returned to the subbasin. There have been large fluctuations in redd counts from the 1950s through the 1990s. For summer Chinook, the run size averaged approximately 1,000 adults from 1980 to the 1990s. Although the Methow Subbasin was once a productive steelhead system, the population now sustains itself only at a threshold population level. Coho, were extirpated in the early-1900s and have recently been reintroduced by the Yakama Nation, with natural reproduction now occurring.

### Natural-Origin Spring Chinook Spawning Escapement Estimate

- **Methow**
- **Twisp**
- **Chewuch**

- Although better than the 1990s, natural-origin spawners have stayed at low levels for the past 15 years
- Hatchery releases are CPUD/DPUD/USFWS mitigation and supplementation efforts
- Yakama Nation will be assisting with experimental acclimation to improve homing to areas of better habitat quality

### Summer Chinook Spawning Escapement Estimate (Natural and Hatchery)

- Purpose of GPUD/CPUD/WDFW hatchery releases are for increased harvest opportunity
- Hatchery returns are segregated from natural tributary spawning populations
Steelhead

- 127 kelts released by the Yakama Nation (2012-2016)

Coho

- Yakama Nation began reintroducing coho in 1997
- Average annual estimated run size - 939 fish (2008-2016)
- 502,000 smolts released per year (average 2008-2015)
**1890s Restoration Project (Methow Subbasin)**

**Fish Present:** Endangered spring Chinook, threatened steelhead, and bull trout

**Problem:** Construction of Highway 20 and a flood control levee redirected the Methow River from the historic main channel, constraining it and reducing important juvenile salmon and steelhead habitat.

**Restoration Actions:**
- Recreated historic channel west of Highway 20
- Installed a groundwater gallery system of perforated pipe buried along the upstream end of the channel
- 56 wood structures installed to create cover habitat and pools
- Riparian zone revegetated with native trees and wetlands

**Benefits:**
- New off-channel habitat provides refuge for rearing juvenile salmonids
- Improved flows provide cool water refuge in summer and an ice-free refuge in the winter
- Wetlands restored

---

**Chewuch River Right Fish Enhancement Project (Methow Subbasin)**

**Fish Present:** Endangered spring Chinook, threatened steelhead, and bull trout

**Problem:** Instream wood removal in the early 1900s and floodplain disconnection and development reduced complex fish habitat.

**Restoration Actions:**
- 2,700 foot historic side-channel excavated and reactivated with perennial flow
- 48 wood structures installed
- 1.55 acres of floodplain wetlands created

**Benefits:**
- Increased habitat complexity and quantity
- Side channel provides hydraulic refuge and rearing habitat for juvenile fish and pool habitat for staging adults
- Installed wood provides cover and creates/maintain scour pools

*Project area after implementation.*
3-D and 3-D LWM Revisited (Entiat Subbasin)

Fish Present: Endangered spring Chinook, threatened steelhead, and bull trout

Problem: Impacts from logging, splash-dams, bank armoring and flood control reduced habitat complexity (i.e., instream wood and wood recruitment) and disconnected the river from its floodplain.

Restoration Actions:
- 800 pieces of wood, including 10 bank-based structures installed
- Developed a connector channel to an existing pond
- Installed fabric enclosed soil lifts and revegetated the riparian area with native plants

Benefits:
- Increased instream complexity and diversity
- Provided access to off-channel rearing habitat and refuge
- Reconnected floodplain and side channel to maintain function of peripheral habitats
- Reduced erosion
- Wood enhanced backwater alcove and channels

Nason Creek Lower White Pine Groups 2 and 3 (Wenatchee Subbasin)

Fish Present: Endangered spring Chinook, threatened steelhead, and bull trout

Problem: Past management actions straightened and simplified the channel while disconnecting it from the floodplain. A lack of riparian vegetation, habitat complexity, and in-stream wood limit rearing habitat for fishes, and results in high stream temperatures.

Restoration Actions:
- 800 foot perennial groundwater alcove connected to existing oxbow pond
- 8 wood structures and scour pools installed
- Revegetated riparian areas
- 2 wetland benches created
- 200 cubic yards of trash removed

Benefits:
- Improved cover and complexity
- Alcove provides rearing habitat and refuge from temperature and flow extremes
- Re-establish stream processes that support high quality habitat and riparian conditions
TRIBAL HARVEST (2008-2016)

- More than 2 million salmon and steelhead harvested (total, Zone 6)
- Record coho harvest in 2014
- Average of 105,655 more fish caught per year than in 2000-2007 (Zone 6)
- Average of 17,993 more sockeye harvested annually than during 2000 to 2007 (Zone 6)
OVERVIEW

In the Treaty of June 9, 1855, the Yakama Nation reserved the right to maintain its culture and the natural resources on which its culture depends, including rights to water, land, and natural foods and medicines at all usual and accustomed places. Subsequent federal court rulings assured the Yakama Nation the right to self-regulation of their own fish management and take, a fair share of all allowable harvest, and the restoration of fish historically present and/or mitigation for losses.

Lyle Falls Tribal Fishery

The Lyle Falls fishery is important for ceremonial, subsistence, and commercial harvest. Klickitat Hatchery production of fall Chinook and coho helps to sustain the fishery that contributes significantly to tribal members’ income. Traditional dip nets, set nets, and jump nets are common fishing methods. Lyle Falls is one of the last places where Yakama tribal members can harvest fish using traditional methods and pass these techniques on to the next generation, ensuring the survival of our way of life.

Tribal Chinook Harvest - Columbia River Zone 6

- Fall
- Summer
- Spring/Summer
- Spring

Source: WDFW

Lyle Falls Tribal Fishery

The Lyle Falls fishery is important for ceremonial, subsistence, and commercial harvest. Klickitat Hatchery production of fall Chinook and coho helps to sustain the fishery that contributes significantly to tribal members’ income. Traditional dip nets, set nets, and jump nets are common fishing methods. Lyle Falls is one of the last places where Yakama tribal members can harvest fish using traditional methods and pass these techniques on to the next generation, ensuring the survival of our way of life.
Construction and operation of hydro-facilities have led to conditions that enhance opportunities for predators to consume juvenile and adult fish. To reduce predation, the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Bonneville Power Administration fund efforts to control predators.

**Sea Lions**
- Threat to salmonids, sturgeon, and lamprey
- Predation has increased in recent years
- Annually consume thousands of returning adult fish (includes sturgeon and lamprey)
- Efforts to reduce predation include hazing and removal

**Caspian Terns and Double-Crested Cormorants (Estuary Populations)**
- Populations have increased significantly in the last 20 years
- Efforts to address predation include redistributing colonies, fencing, nest destruction, hazing, and (when necessary) lethal take.

**Lake Cle Elum Non-Native Predator Removal**
- To increase sockeye survival, invasive mackinaw trout have been removed by the Yakama Nation since 2013
- Unlimited harvest regulations enacted in 2015

**Northern Pikeminnow**
- Dam construction has led to increased predation on juvenile salmonids
- Active sport-reward pikeminnow fishery has reduced annual predation by one-third
- Abundance has been reduced

**East Island**
Yakama Nation Lower Yakima River Predation Study

- Fish predators include pikeminnow, smallmouth bass, and non-native warm-water fish
- Major avian predators observed include white pelicans, cormorants, herons, and gulls
- Yakama Nation has recovered thousands of PIT tags from salmonids throughout the lower Yakima River

Caspian Terns and Double-Crested Cormorants (Inland Populations)

- Nesting colonies of terns on Goose, Crescent, and Blalock islands
- Cormorants are nesting on Foundation Island
- Reduction techniques include hazing, substrate/vegetation modification, constructing berms, and taking eggs

Note: Non-lethal hazing also conducted at all federal lower Columbia River and Snake River dams, with limited lethal removal of gulls at McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams.
Construction and operation of hydroelectric dams in the Columbia River Basin have significantly impacted fish and wildlife populations important to the Yakama Nation. Without mitigation for loses, the dams would jeopardize the existence of the Yakama Nation’s treaty trust natural resources.

Improvements to the dams have been implemented as a result of the Accords. Many of these changes were advocated for by the Yakama Nation and others to be included in the agreement. In addition to the Accord, other requirements are in place as a result of court orders and the NOAA 2008 BiOp for the Federal Columbia River Power System operations.

JUVENILES: SPILL, FLOW, AND RUN-TIMING

Spill and flow are important for the survival of juvenile salmonids passing through the Columbia and Snake River hydropower system. Increased spill levels reduce passage delay and the time required to pass through the Columbia River, improving downstream survival. In addition, surface spill provides a safer route with lower mortality than through bypasses and turbines, increasing survival through the entire system.

General Improvements

- Travel times have declined due to increased flows and surface spill structures
- Structural and operational improvements have increased survival; however, concern exists regarding excessive dissolved gas

Average Juvenile Travel Time: McNary Dam to Bonneville Dam (April - June)*

*Travel times calculated from data reported at Fish Passage Center (fpc.org) (Photo: USACE)
Improving Juvenile Survival: Hydro-facility Modifications

Hydro-facility designs can cause increased mortality. Through the 2008 BiOP and Accord Agreement, some issues are being addressed. The modifications may have contributed to whole-system survival improvements (Snake River spring migrants) of 4% for Chinook, 13% for steelhead, and 16% for sockeye (1999-2008 vs. 2009-2015). Concern remains regarding late-summer migrating species. Additional evaluations are needed to ensure court-ordered survival targets are met.

**Turbine Bypass**
- Screened juvenile bypass systems at 7 of the lower Columbia and Snake River dams
- Adjusting the location of the outfall and deterring predators may be required to improve survival
- Bypass survival is lower compared to spillway values

**Surface Fish Passage (spillway weirs)**
- Provide a more natural route by allowing fish to pass near the surface
- Exist at all lower Columbia River and Snake River dams
- Surface passage may reduce travel time

**Turbine Passage**
- Potentially 30% of the summer migrants pass through turbines
- Modifications to blades, walls, and operations have reduced mortality and injury
Temperature Improvement at Lower Granite Dam

Since 2013, high water temperature has been a problem for migrating salmonids with significant sockeye mortality experienced in 2015. In May 2016, the USACE installed a structure to alleviate a thermal barrier to migrating Snake River fish.

- Structure draws cool water from deep in the reservoir through an “intake chimney”
- Water is directed to the forebay through a diffuser, the middle of the ladder, and to the adult trap
- System should eliminate the problematic thermal barrier
RECENT PASSAGE IMPROVEMENT PROJECTS FOR ADULT PACIFIC LAMPREY

Bonneville Dam (Washington Shore Ladder)
- Radio-tracking studies have shown that this side of the dam attracts more lamprey
- Bypasses known “trouble spots” for lamprey passage, such as the fishway entrance.
- Features two entrances, attraction flow, and grates that block salmon entry

John Day Dam
- Structures were installed to reduce velocities at the ladder entrance and lower ladder
- Seamless floor connections and plating installed
- Fabricated the ladder with rounded corners (90° corners present an attachment challenge)
- Installed diffuser grating in the lower part of the ladder
- Entrance weirs removed

For information about the new Prosser Dam lamprey passage structure, see the Yakima Subbasin section of this report.
Why is the Yakama Nation concerned about toxic contaminants?
The Columbia River, its tributaries, and the fish that depend upon them are of paramount importance to the Yakama Nation, to the diets of our people, and to our health. Toxics in the sediments and surface water are in high concentrations at numerous hazardous waste sites, and have already been documented as posing grave risks for juvenile salmon, Pacific lamprey, and sturgeon.

Where are the contaminated sites?
Over 70 priority hazardous waste sites are located in Yakama Nation’s homeland, including Portland Harbor, Bradford Island, and Holden Mine. Releases of hazardous substances at these sites have led to high levels of toxics in soils, sediments, surface waters, groundwater, and pore water.
The Yakama Nation is a natural resource trustee under:

- Section 107(f) of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9607(t)

How is the Yakama Nation ensuring the releases are addressed?

The Yakama Nation has authority as a natural resource trustee to restore, rehabilitate, and/or replace natural resources that have been lost or injured by releases of hazardous substances from facilities. This is usually done through restoration projects.

- Advocating for cleanups that will protect Yakama People and resources from these contaminants
- Restoring and enhancing natural resources lost or injured by hazardous substances released from facilities