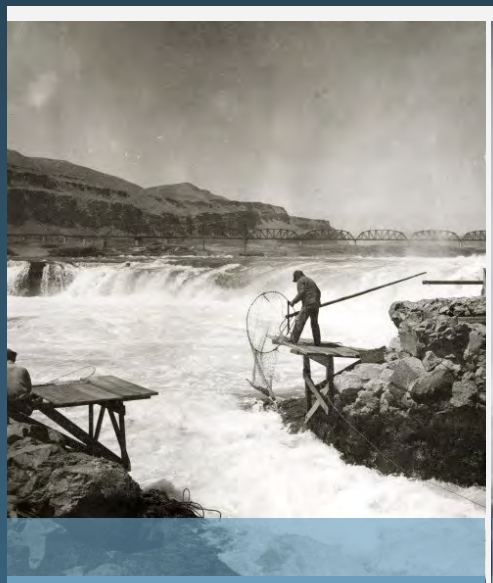
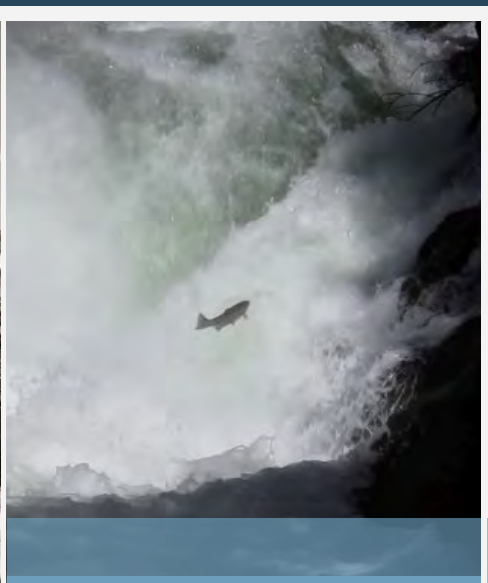
Status and Trends Annual Report **2017**



Honor



Protect

Restore

COMPREHENSIVE REPORT

Yakama Nation Fisheries

FROM OUR FISH AND WILDLIFE COMMITTEE

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 Nchʼi-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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Kelt reconditioning, Prosser Hatchery (YN)

Shane Lloyd, tribal fisher, Klickitat Gorge (Erika Schultz, Seattle Times)

EXECUTIVE SUMMARY

Source: Accord-funded metrics reported to cbfish.org (7/11/2017), plus Klickitat work with combined SRFB/BPA-funding (rco.wa.gov).

YAKAMA NATION FISHERIES PROGRAM

OVERVIEW

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**

Coho reintroduction (YN)

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)

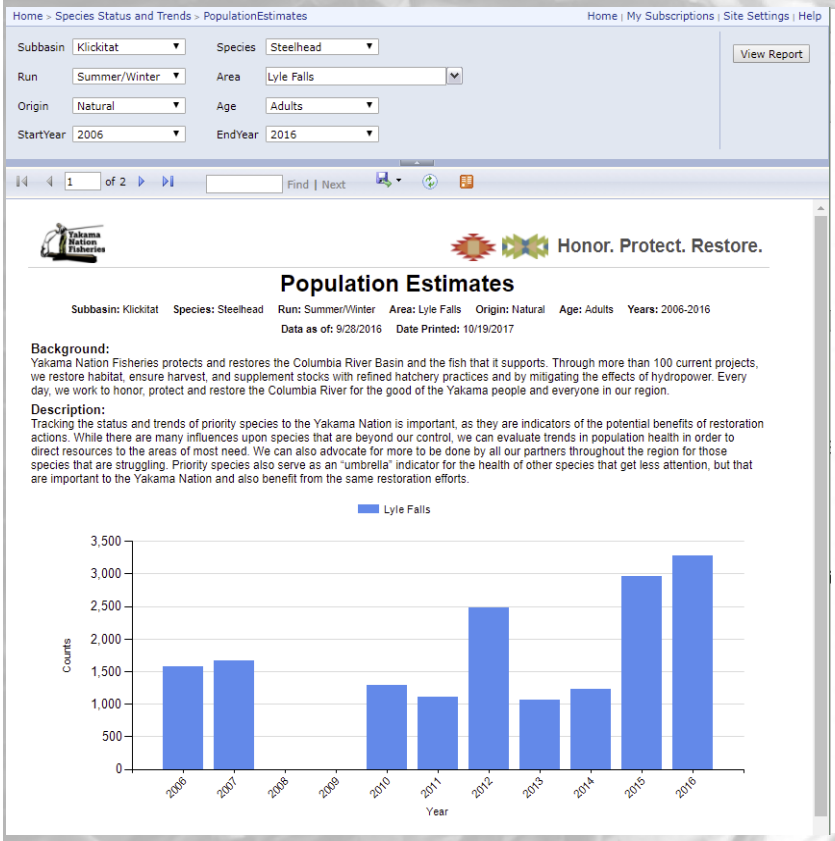
YAKAMA NATION FISHERIES PROGRAM

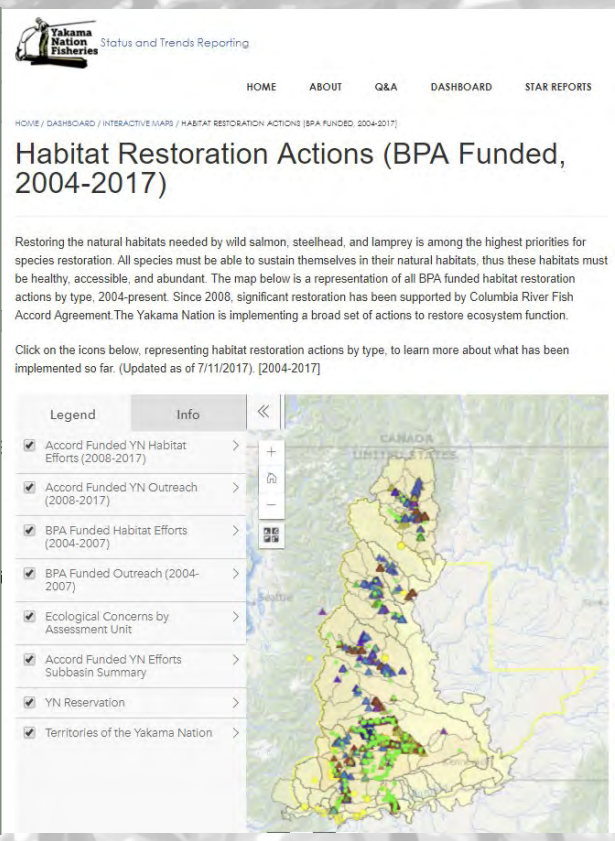
STAR PROJECT

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





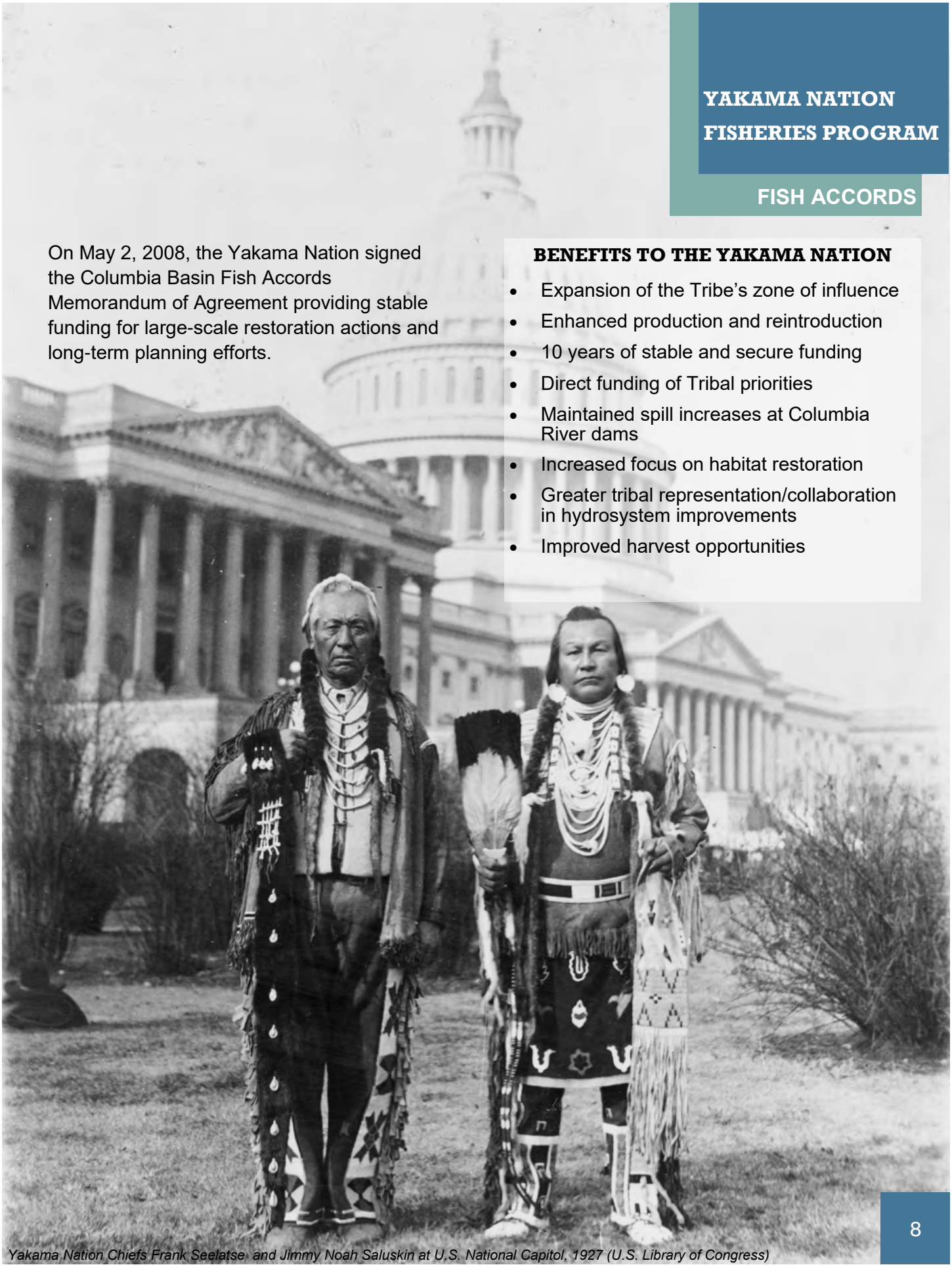
To learn more about the Yakama Nation Fisheries' Status and Trends Project and to download this report, please visit www.yakamafish-nsn.gov/restore/projects/star.

FISH ACCORDS

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.

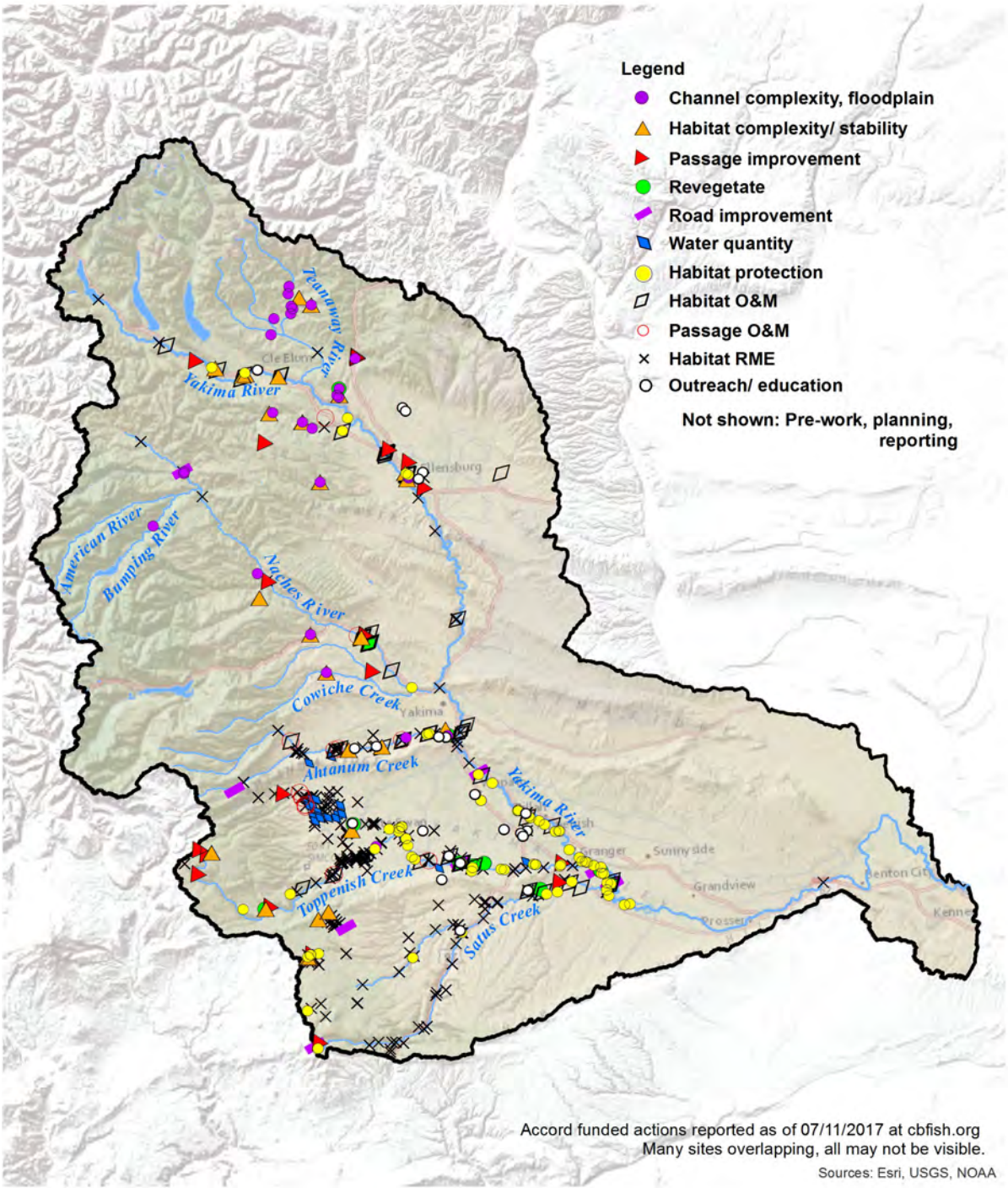
BENEFITS TO THE YAKAMA NATION

- 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



Yakama Nation Chiefs Frank Seelatse and Jimmy Noah Saluskin at U.S. National Capitol, 1927 (U.S. Library of Congress)

Accord-funded Habitat Actions Implemented from 2008 to 2017



ECOLOGICAL CONCERNS IN THE YAKIMA SUBBASIN

Ecological Concern	YN Addressing*
Predation**	◐
Temperature	◕
Decreased water quantity	◐
Altered primary productivity**	○
Floodplain condition	◕
Riparian vegetation	◕
Man-made barriers	◐
Large wood recruitment	◕
Bed and channel form	◔
Instream structural complexity	◐
Side channel/wetland conditions	◐
Altered flow timing	◔
Reduced genetic adaptiveness**	◐
Increased sediment quantity	◕
Competition	◔
Projects addressing: ◕ Numerous ◐ Many ◔ Some ○ Not directly (Rankings relative within this subbasin only)	

Taneum Creek Wood Replenishment (YN)

**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.

Fish Passage
- 4 barriers removed
- 4 barriers improved
- 122 miles of habitat now accessible

Instream Habitat
- 230 structures installed
- 2,550 logs installed (10,000 in progress)
- 40 miles of stream improved
- 1 mile of dike removed/modified
- 8 exclusion structures installed
- 1.75 miles of stream channel created

Wetland Habitat
- 1,330 acres protected
- 4,000 acres improved

Riparian Habitat
- 66 miles protected (33 miles by fence)
- 640 miles improved

Upland Habitat
- 4 miles of road blocked/removed/improved
- 9,000+ acres treated/improved
- 74,500 acres protected

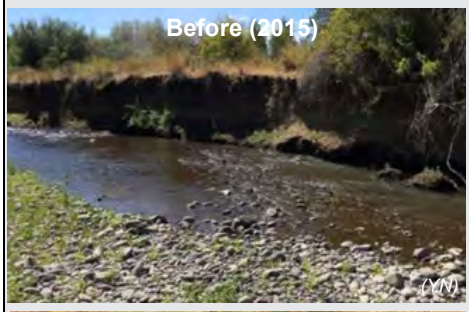
Water Quality
- 4,000 pounds of trash collected

Water Quantity
- 2 alternative sources identified

Outreach
- 22,700 people contacted

**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

Taneum Creek after wood loading, recent riparian re-growth, and stream complexity.

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:

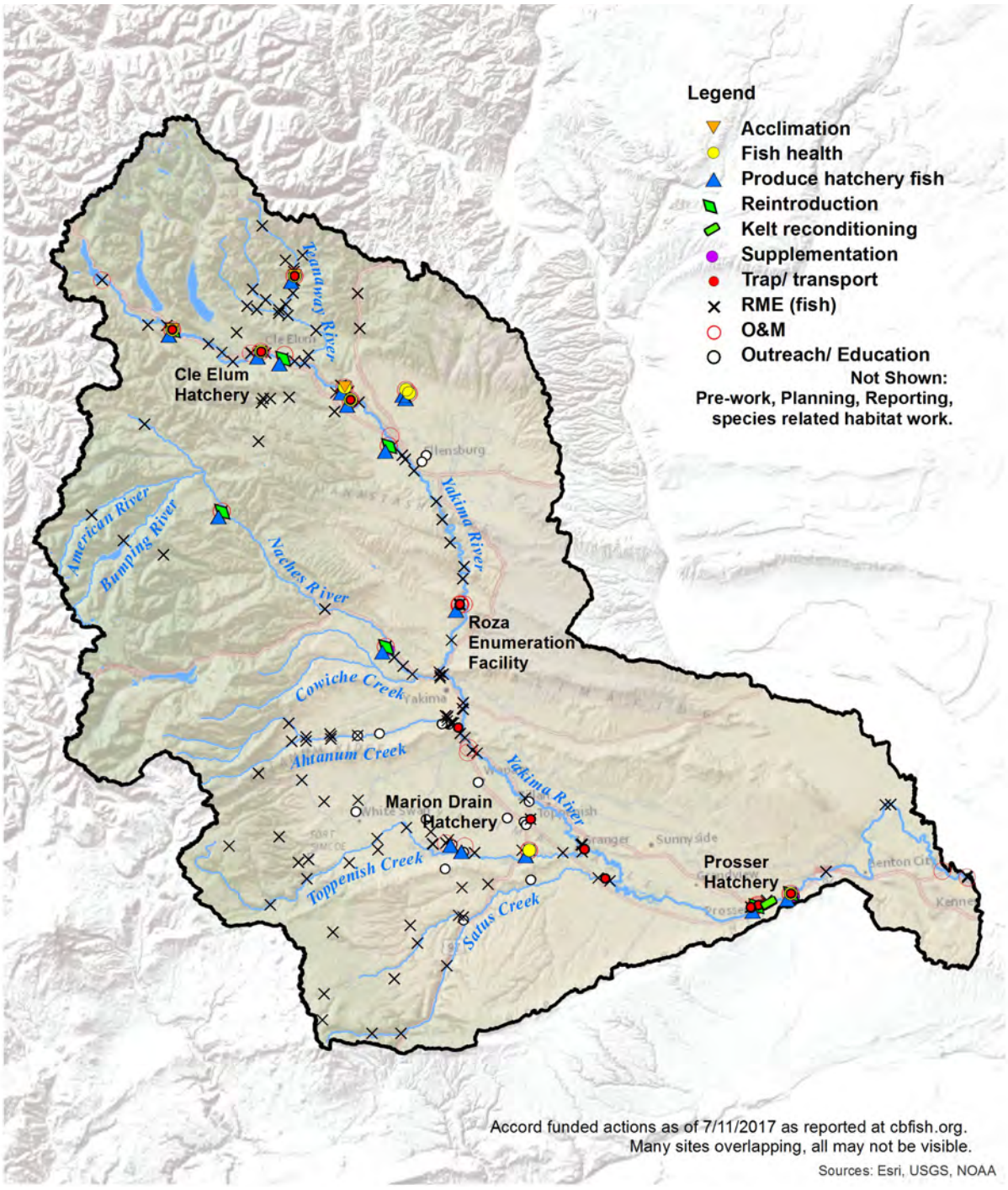
- 13,700 logs and 1,300 rootwads placed along 9 miles of Indian, Middle, Dickey, Jungle, Rye, Lick, Carlson and First creeks to restore stream habitats and watershed function.

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



YAKAMA NATION HATCHERIES IN THE YAKIMA SUBBASIN

(YN)

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

(YN)


(YN)

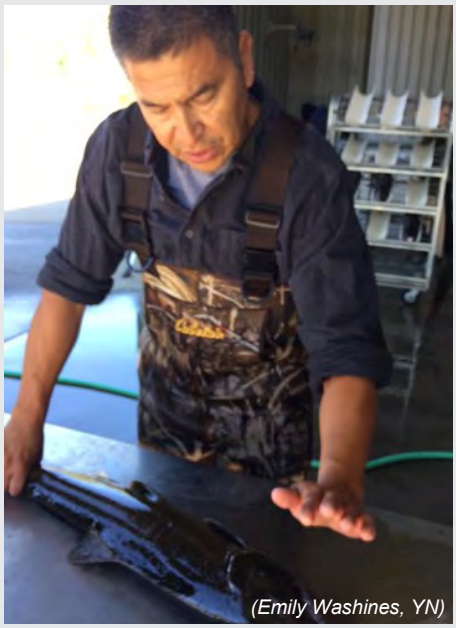
Marion Drain Hatchery

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.

(Emily Washines, YN)



Sampling a Cle Elum spring Chinook.

CESRF Integrated Hatchery Program Research

Background: Since 1997, the Yakama Nation has been conducting research at the hatchery to address critical uncertainties and improve hatchery practices.

Goals: Increase natural production while maintaining population fitness and limiting potential genetic or ecological impacts.

Results:

- Increased spawner abundance, spatial distribution, and harvest
- Maintained natural-origin returns
- Managed gene flow in hatchery population

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.

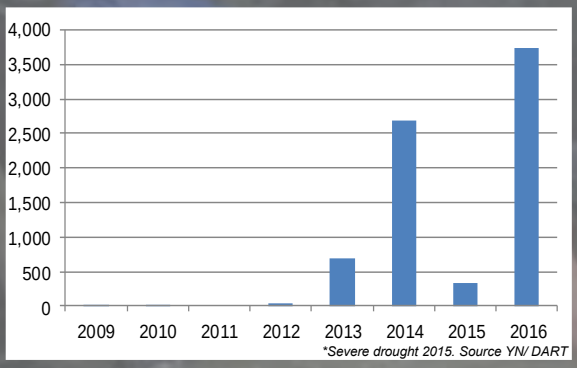
REINTRODUCTION PROJECTS

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



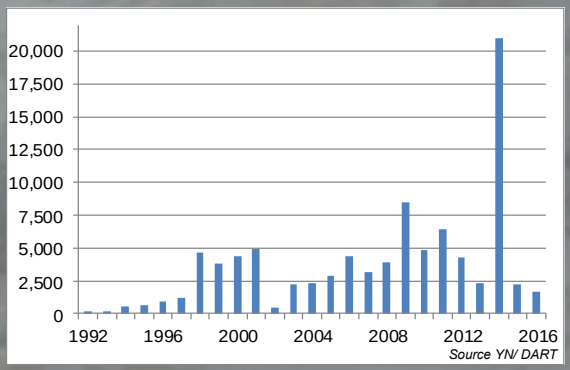
*Severe drought 2015. Source YN/ DART

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



Source YN/ DART

*Sockeye reintroduction funded by NOAA's PCSRF fund, U.S. BOR, and Grant County PUD.

Processing broodstock at Prosser. (Emily Washines, YN)

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.

Sturgeon project staff spawning a white sturgeon.

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)

Background photo: Juvenile sturgeon release (YN)

PACIFIC LAMPREY PROJECT

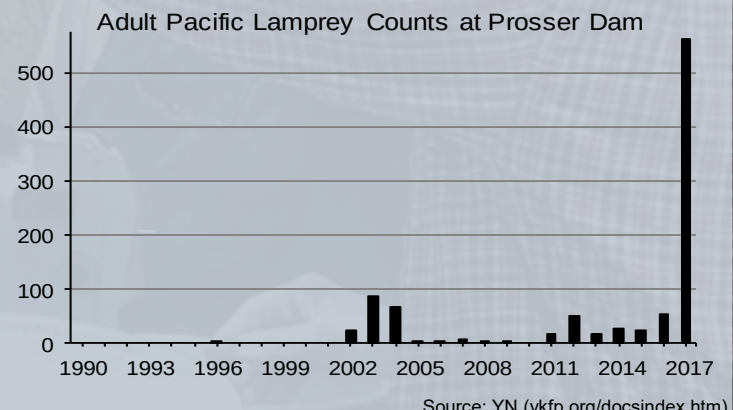
Background: Of significant cultural and ecologic value, Pacific lamprey have declined throughout their range. Since 2009, the Yakama Nation has been restoring lamprey throughout the reservation and Tribal territories.

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**



Source: YN (ykfp.org/docsindex.htm)

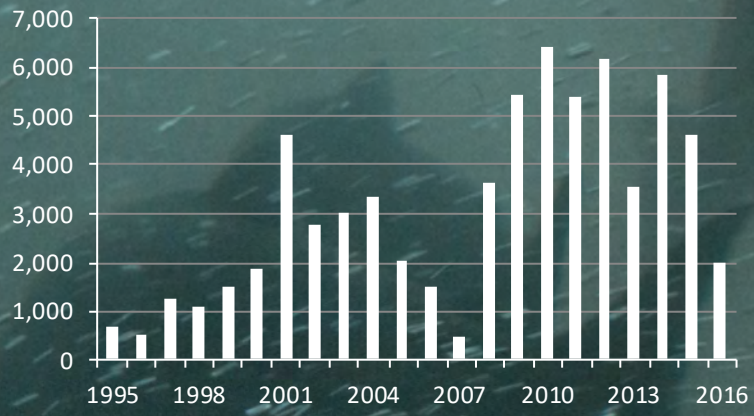
Note: Translocation and surveys Accord-funded. Other work supported by Bureau of Reclamation and Public Utility Districts.

Photo: Translocation event (David Child, DC Consulting LLC)

SPECIES STATUS

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.*

Natural Adult Summer Steelhead Counts at Prosser Dam

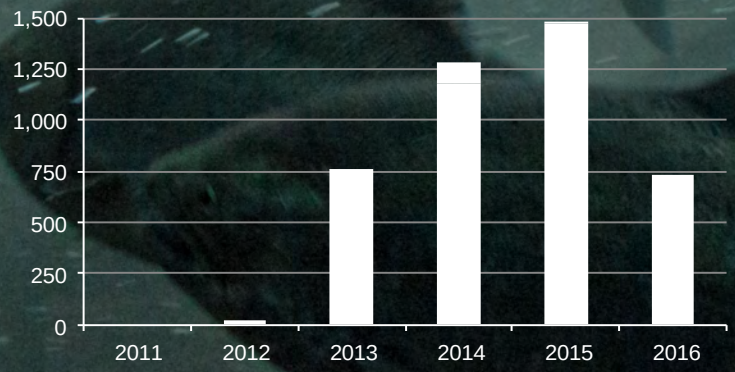


Source: YN (ykfp.org/docsindex.htm)

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)

Adult Summer Chinook Counts at Prosser Dam



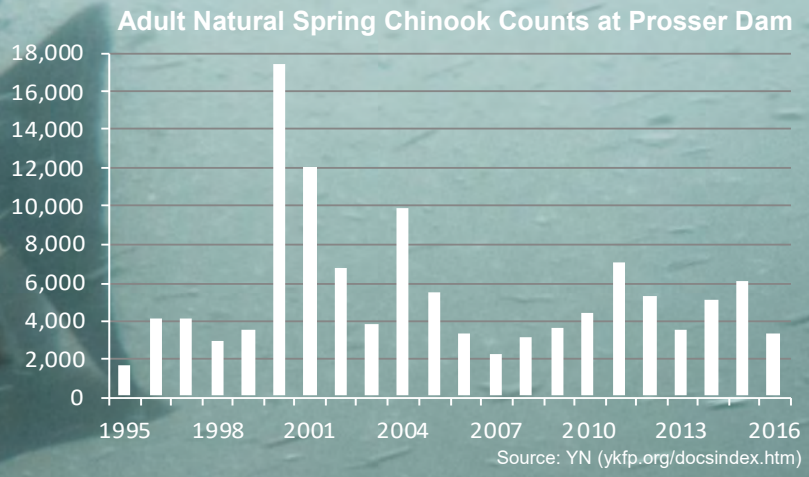
Source: Sampson, M., et al. 2017. Yakima-Klickitat Fisheries Project Monitoring and Evaluation - Yakima Subbasin. BPA Project # 1995-063-25 (available at cbfish.org)

Summer Chinook

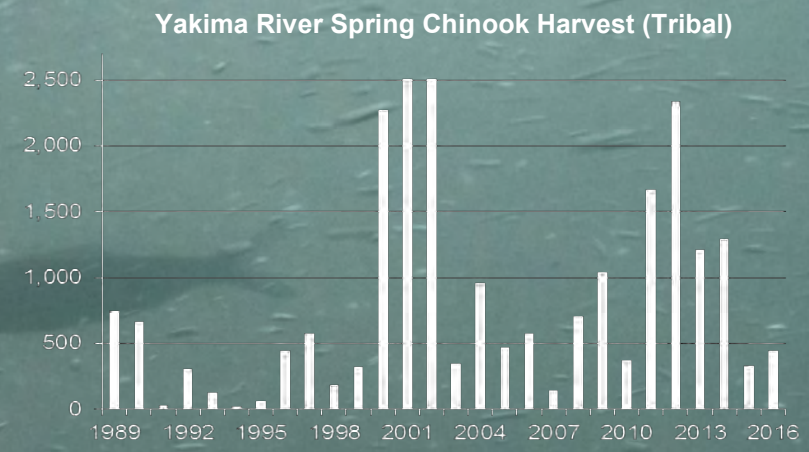
- Extirpated from the Yakima Subbasin by 1970
- Reintroduced with Yakama Nation juvenile releases starting in 2009
- **Goal:** Self-sustaining locally-adapted population contributing to the fishery

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.



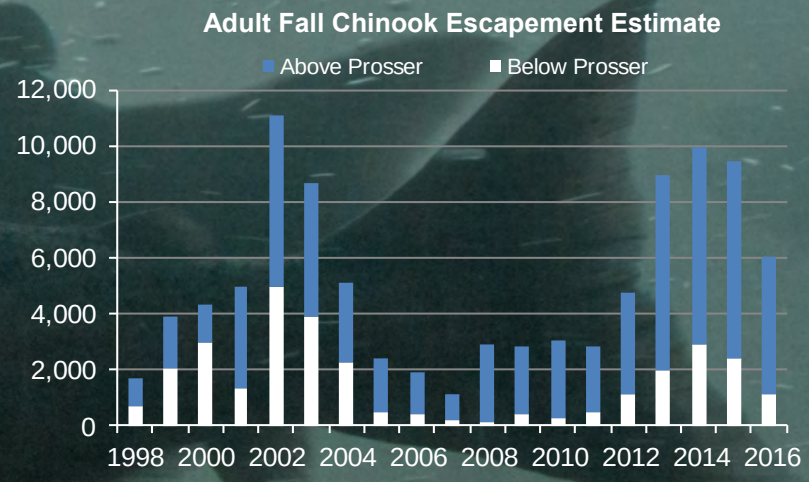
Source: YN (ykfp.org/docsindex.htm)



Source: YN (Roger Dick Jr, personal communication)

Fall Chinook

- **Escapement**: Greater in 2002, 2014, and 2015 than any previously recoded 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

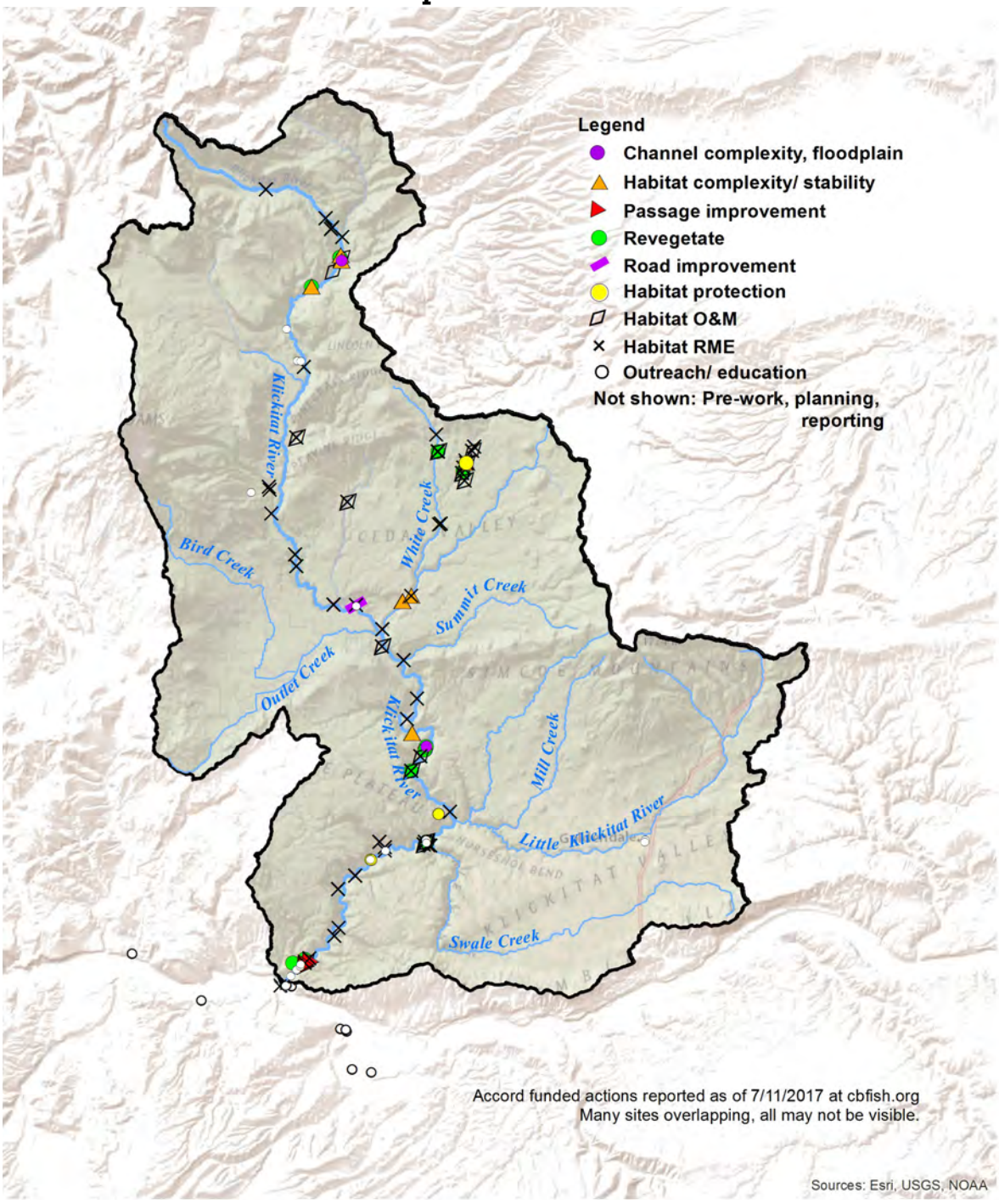


Source: Sampson, M., et al. 2017. Yakima-Klickitat Fisheries Project Monitoring and Evaluation - Yakima Subbasin. BPA Project # 1995-063-25 (available at cbfish.org)

*See page 16 for Yakima Subbasin sockeye and coho information.

(*Photo Credit: Tony Grover, Flickr*)

Accord-funded Habitat Actions Implemented from 2008 to 2017



ECOLOGICAL CONCERNS IN THE KLICKITAT SUBBASIN

Ecological Concern	YN Addressing*
Instream structural complexity	◐
Bed and channel form	◕
Floodplain condition	◐
Riparian vegetation	◕
Large wood recruitment	◕
Decreased water quantity	◒
Altered flow timing	◐
Altered primary productivity**	○
Competition	◒
Side channel/ wetland conditions	◕
Temperature	◕
Man-made barriers	◐
Increased sediment quantity	◕
Turbidity	◒

Projects addressing: ◕Numerous ◐Many ◒Some ○Not directly
(Rankings relative within this subbasin only)

Klickitat River restoration (Photo: Columbia Land Trust)

**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

Tepee Creek Meadows Restoration (Phase 2)

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.

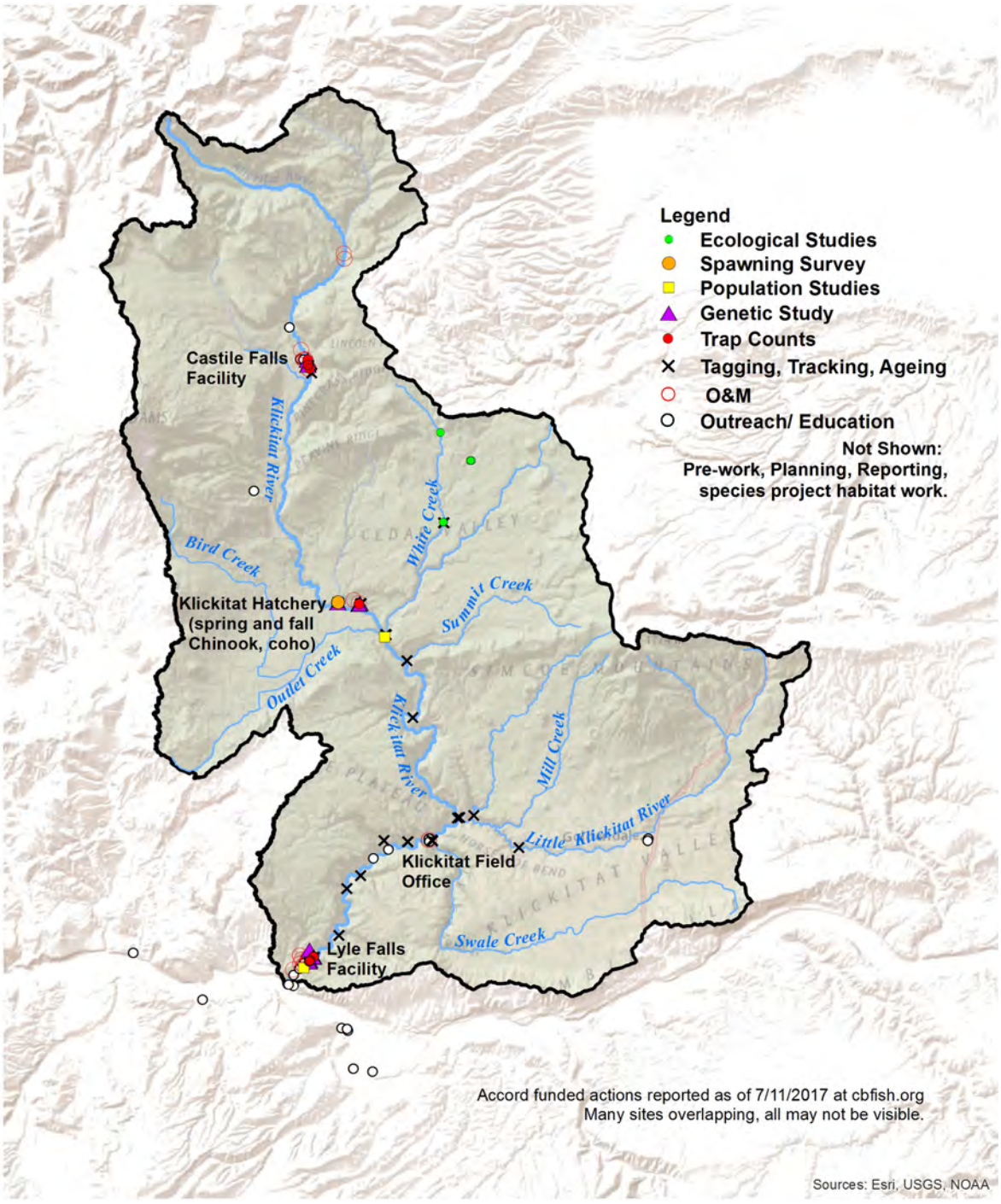
Restoration Actions:

- 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



YAKAMA NATION PRODUCTION IN THE KLICKITAT SUBBASIN

(YN)

In 2006, the Yakama Nation assumed responsibility for the operation of Klickitat Hatchery and the Lyle and Castile 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*

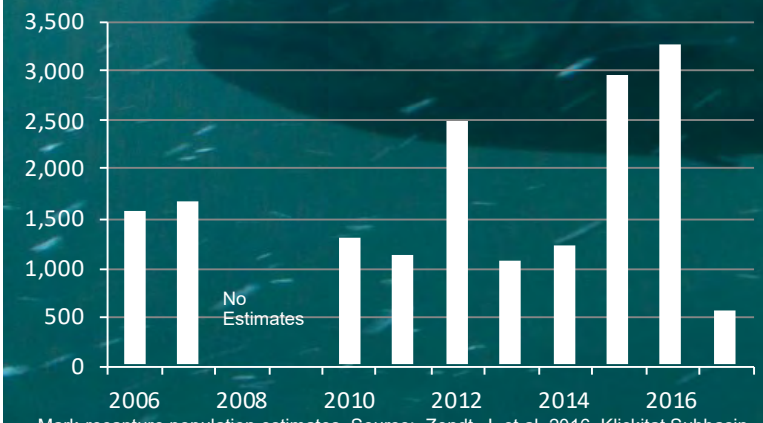
Yakama Tribal member fishing in the Klickitat River for fall Chinook salmon (Photo: *Ryan Hagerty, USFWS*)

KLICKITAT SUBBASIN

SPECIES STATUS

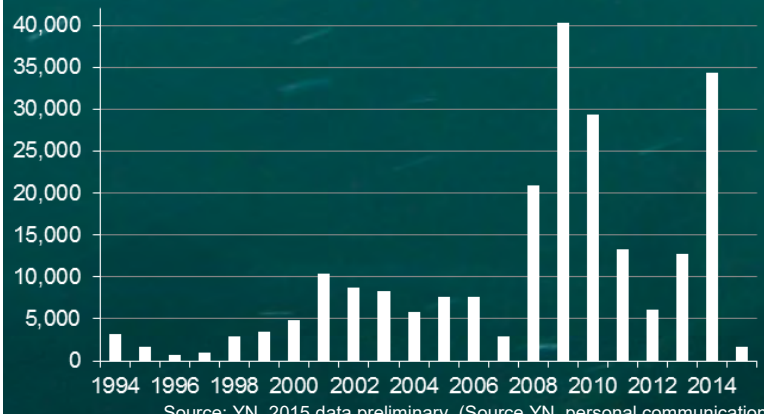
In the 1950s, an average of 2,523 spring Chinook (adults and jacks) returned annually to the Klickitat Subbasin; however, from 1977 to 2003 returns decreased to an average of 1,900 adult fish annually (includes hatchery-origin fish). The Klickitat Subbasin supports native winter and summer steelhead 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.

Wild Summer/Winter Steelhead Population Estimate



Mark-recapture population estimates. Source: Zendt, J. et al. 2016. Klickitat Subbasin Monitoring and Evaluation BPA Project # 1995-063-35. (available at cbfish.org)

Coho Total Harvest (Sport and Tribal)



Source: YN. 2015 data preliminary. (Source YN, personal communication)

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)

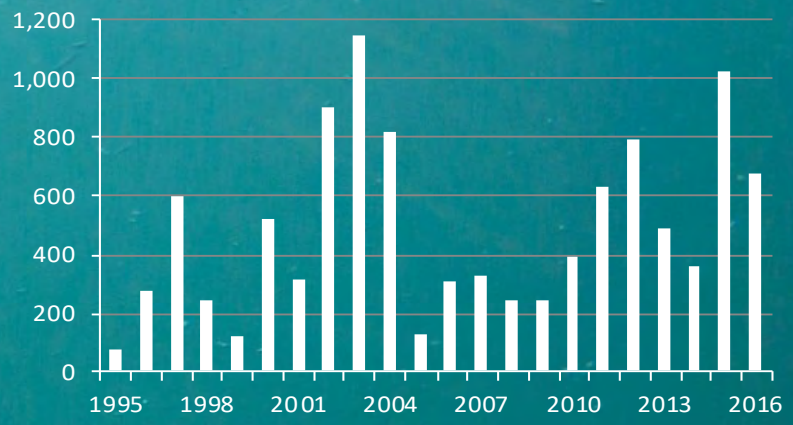
Coho

- Yakama Nation releases 1 million coho/ year (combined with WDFW, 9.5 million released since 2008)
- On average, 12,779 more coho harvested annually 2008-2015 versus 2000-2007

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

Wild Spring Chinook Escapement Estimate

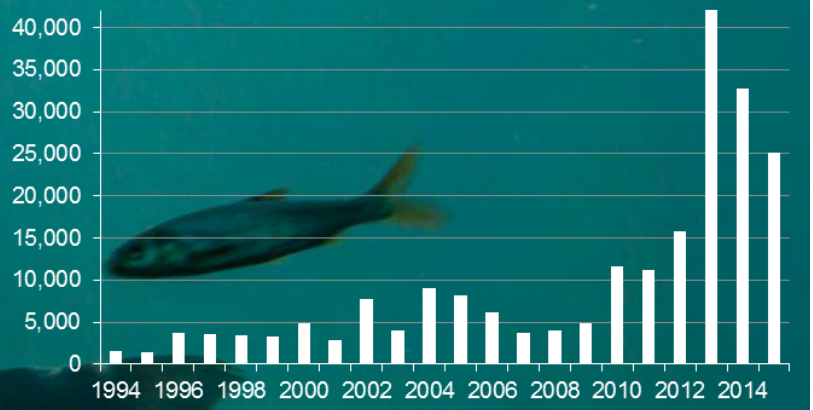


Based on red surveys, at times limited by conditions. Source: Zendt, J. et al. 2016. Klickitat Subbasin Monitoring and Evaluation BPA Project # 1995-063-35. (available at cbfish.org)

Fall Chinook

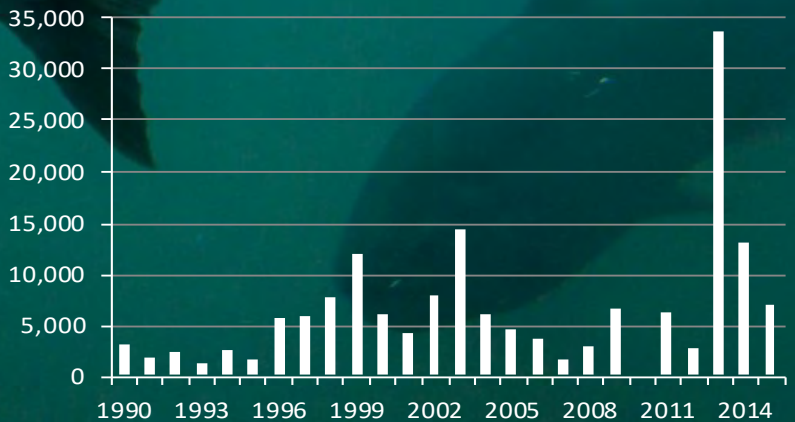
- Population sustained by hatchery production with most spawning occurring from the Klickitat Hatchery downstream to Twin Bridges
- Returns in recent years have been strong
- 30.8 million smolts (3.4 million/year average) released since 2008
- On average, 12,655 more fall Chinook harvested annually 2008-2015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

Klickitat Fall Chinook Harvest (Sport and Tribal)



Source: YN. 2015 data preliminary. (Source YN, personal communication)

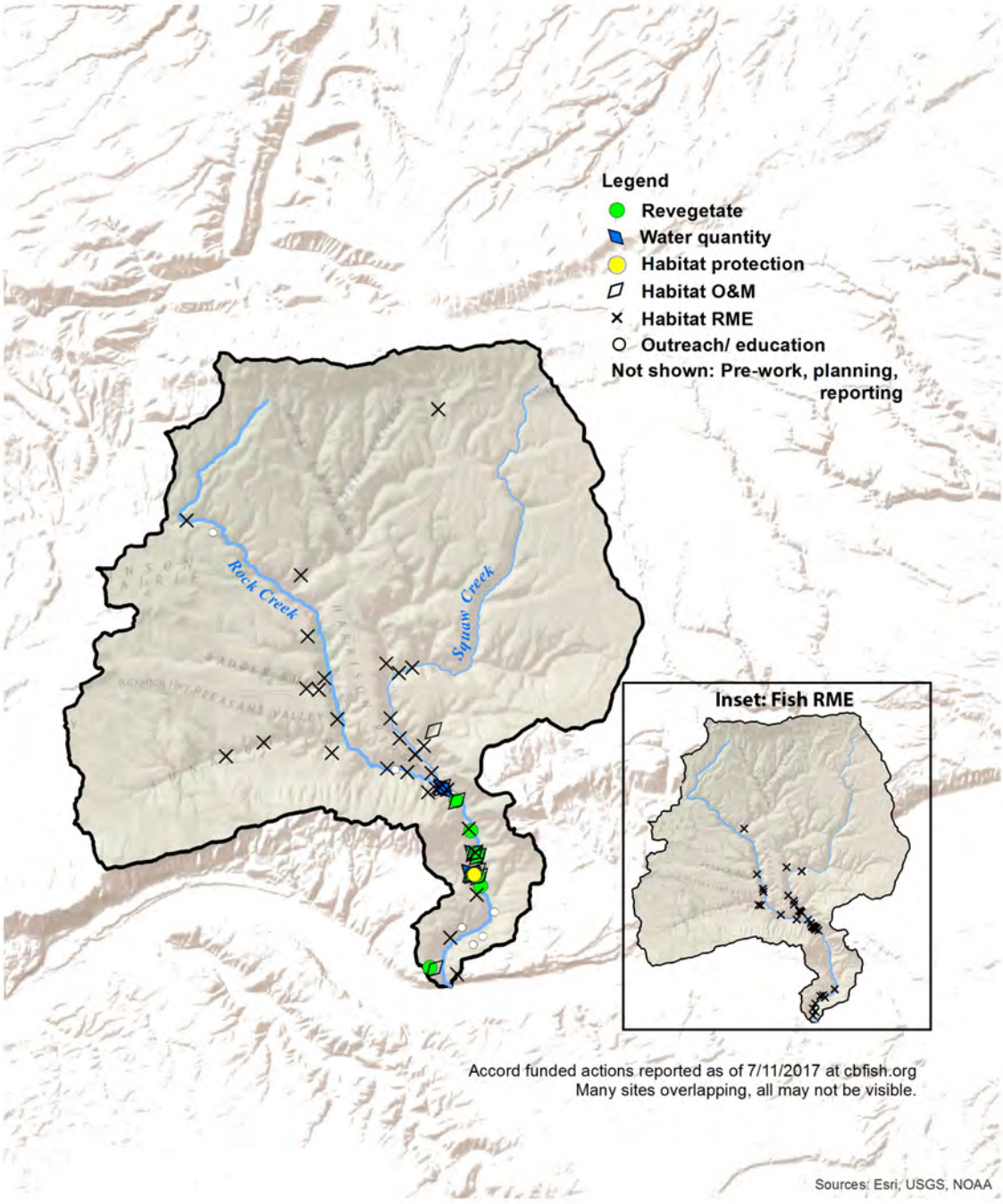
Fall Chinook Escapement Estimate



Expanded counts based on spawners plus carcasses, although visibility poor. Source: YN (Joe Zendt, personal communication)

(Photo Credit: Tony Grover, Flickr)

Accord-funded Habitat Actions Implemented from 2008 to 2017



ECOLOGICAL CONCERNS IN THE ROCK CREEK SUBBASIN

Ecological Concern	YN Addressing*
Decreased water quantity	◒
Altered flow timing	◒
Instream structural complexity**	◒
Bed and channel form	○
Riparian vegetation	◕
Floodplain condition	○
Side channel/wetland conditions	◒
Temperature	◐
Competition	○
Altered prey species composition, diversity	◒
Altered primary productivity	○
Oxygen	○
Turbidity	◒
Increased sediment quantity	◕
Toxic contaminants**	◒
Projects addressing: ◕Numerous ◐Many ◒Some ○Not directly (Rankings relative within this subbasin only)	


Rock Creek Steelhead (YN)

*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

Wetland Habitat

- 0.3 acres improved

Riparian Habitat

- 15 miles treated/improved
- 65 acres improved

Upland Habitat

- 24 acres of vegetation maintained
- 14 acres treated/improved

Outreach

- 540 people contacted

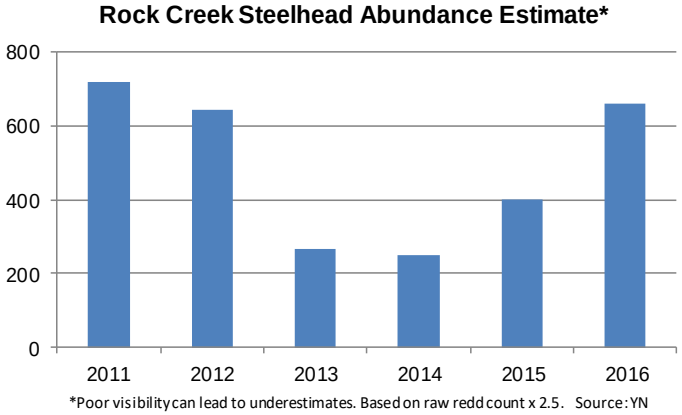
*BPA-funded metrics reported to cbfish.org 1/1/2008- 07/11/2017

Steelhead Status Update

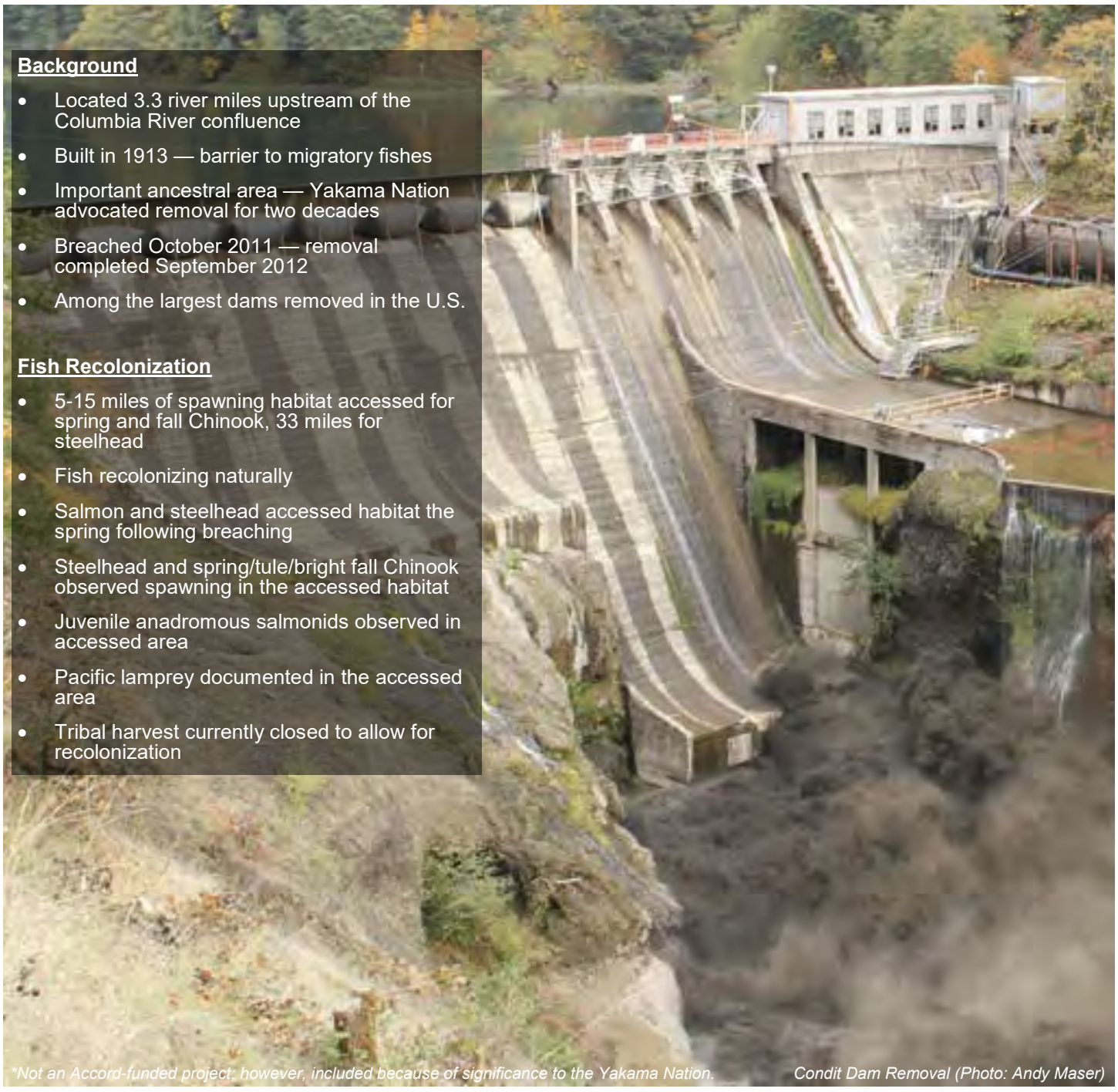
Historically, steelhead runs occurred in Rock Creek; however, by the 1990s the population had become depressed.

- 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.



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

Restoring habitat in the former reservoir location.

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)

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:

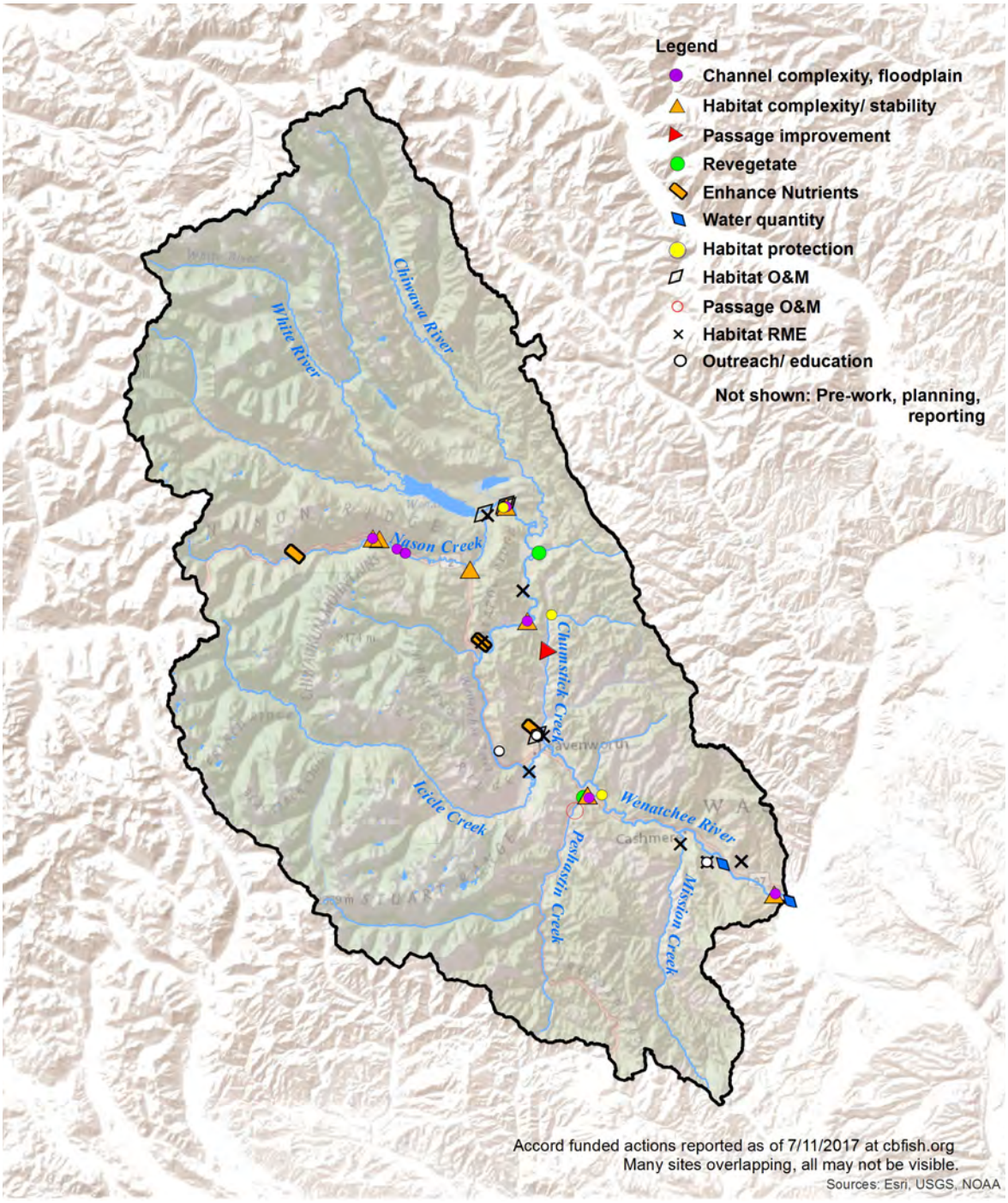
- Sediment that filled the boat basin will be removed in the winter of 2017/18 and used to develop riparian islands

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.

White Salmon River mouth in February 2012.

Accord-funded Habitat Actions Implemented from 2008 to 2017



ECOLOGICAL CONCERNS IN THE WENATCHEE SUBBASIN

Ecological Concern	YN Addressing*
Altered primary productivity	◐
Instream structural complexity	◕
Side channel/wetland conditions	◕
Man-made barriers	◒
Bed and channel form	◕
Decreased water quantity	◐
Riparian vegetation	◐
Floodplain condition	◒
Increased sediment quantity	◐
Temperature	◕
Mechanical injury	○

Projects addressing: ◕ Numerous ◐ Many ◒ Some ○ Not directly
(Rankings relative within this subbasin only)

Chumstick North bridge replacement/fish access project (YN)

**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.*

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 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

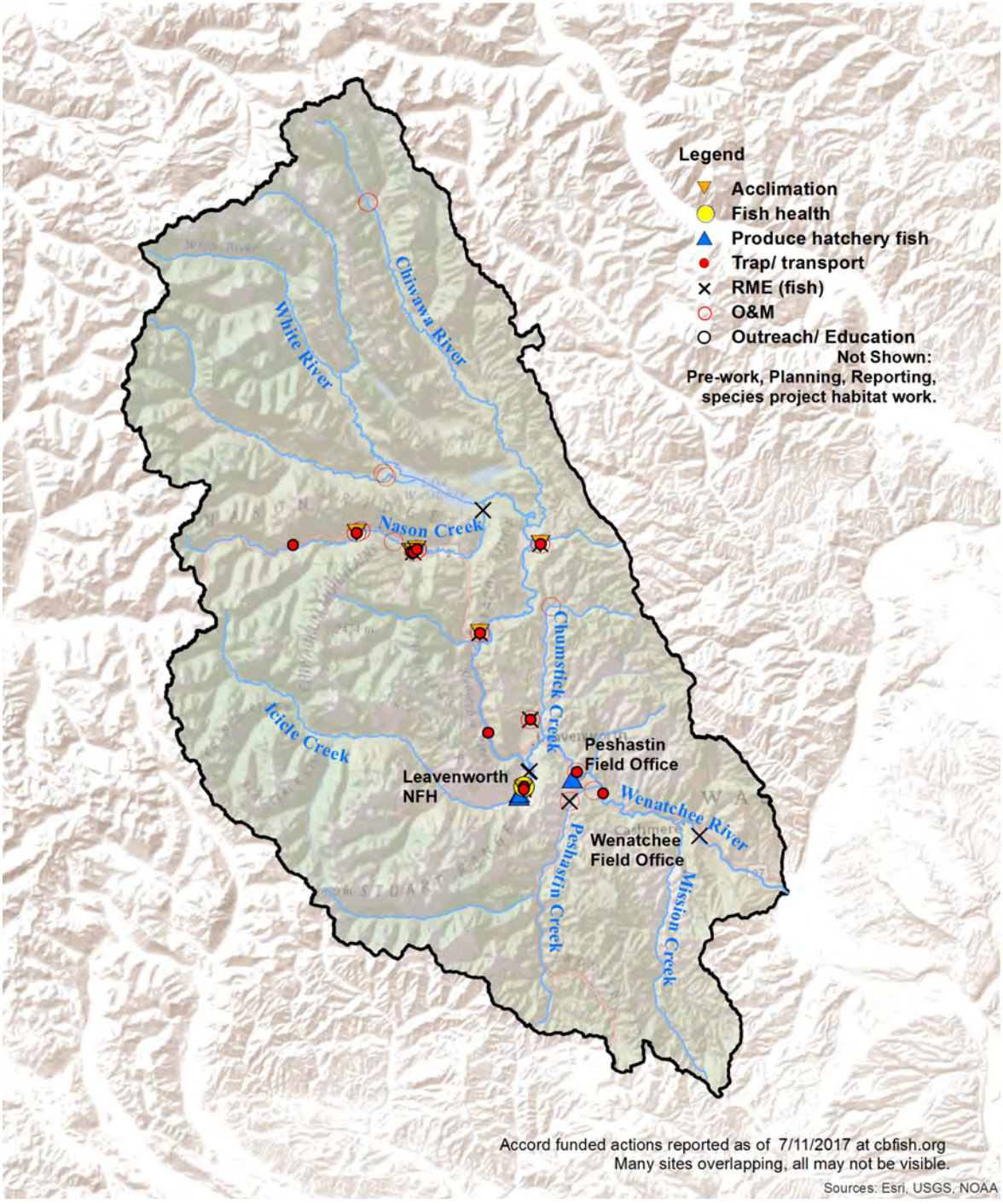
- 7,200 pounds of nutrients added to 70 miles of stream

Instream Habitat

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

Metrics reported to cbfish.org as of 07/11/2017

Accord-funded Production Actions Implemented from 2008 to 2017



YAKAMA NATION PRODUCTION IN THE WENATCHEE SUBBASIN

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.

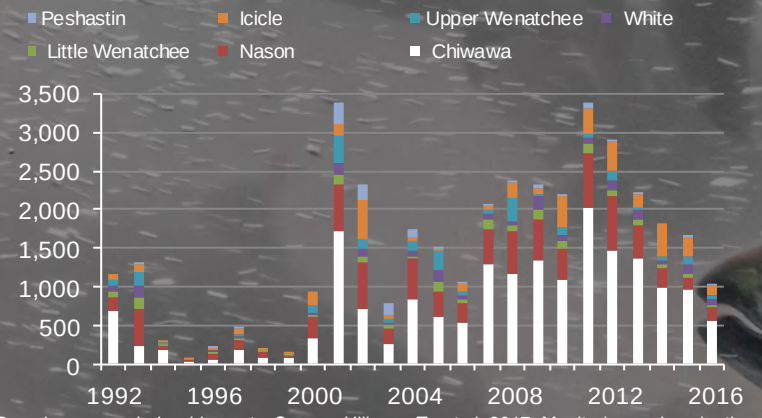
(YN)

SPECIES STATUS

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.

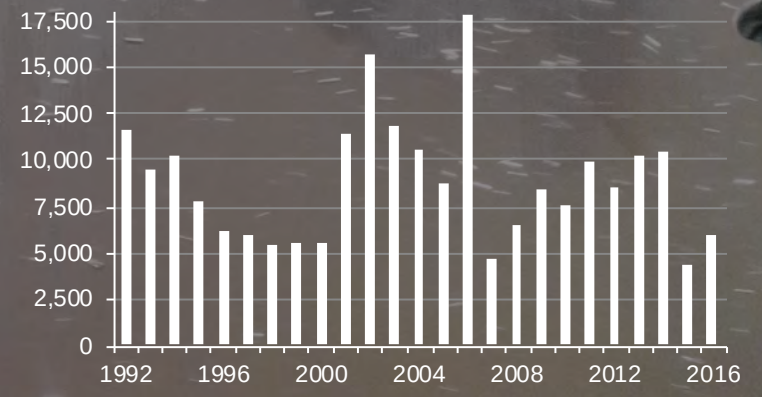
* Icicle Creek steelhead originally hatchery-origin and are not ESA-listed

Spring Chinook Escapement Estimate, Natural and Hatchery



Based on expanded redd counts. Source: Hillman, T., et al. 2017. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2016 Annual PUD Report. (www.gcpud.org)

Summer Chinook Escapement Estimate, Natural and Hatchery



Based on expanded redd counts. Source: Hillman, T., et al. 2017. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2016 Annual PUD Report. (www.gcpud.org)

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

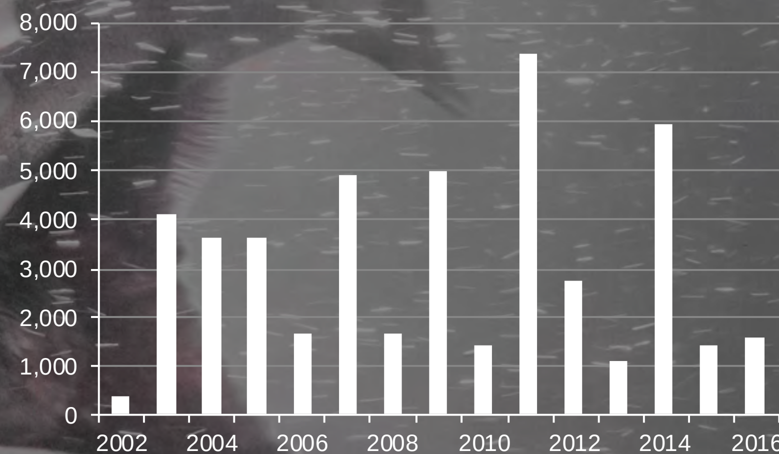
Summer Chinook

- 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)

Coho Escapement Estimate, Natural and Hatchery

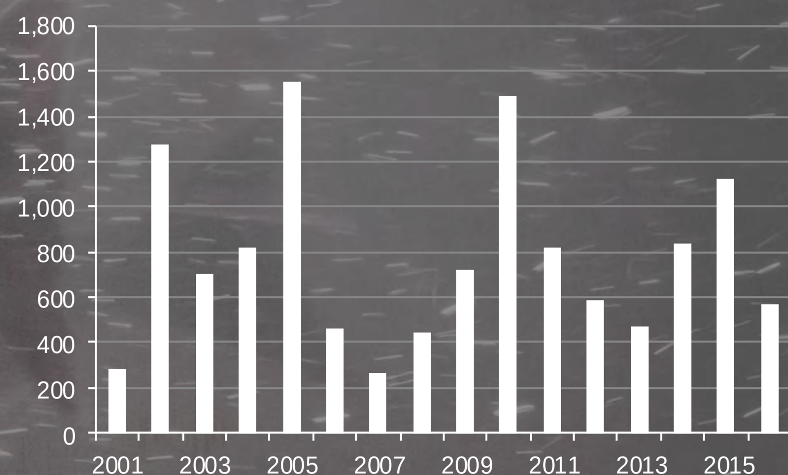


Based on Tumwater Dam counts, redd counts below the dam, and broodstock collected (except 2002-2003 are Dryden Dan counts). Source: Ishida et al. 2016. Mid-Columbia Coho Reintroduction Feasibility Study. BPA Project # 1996-040-00 (cbfish.org)

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

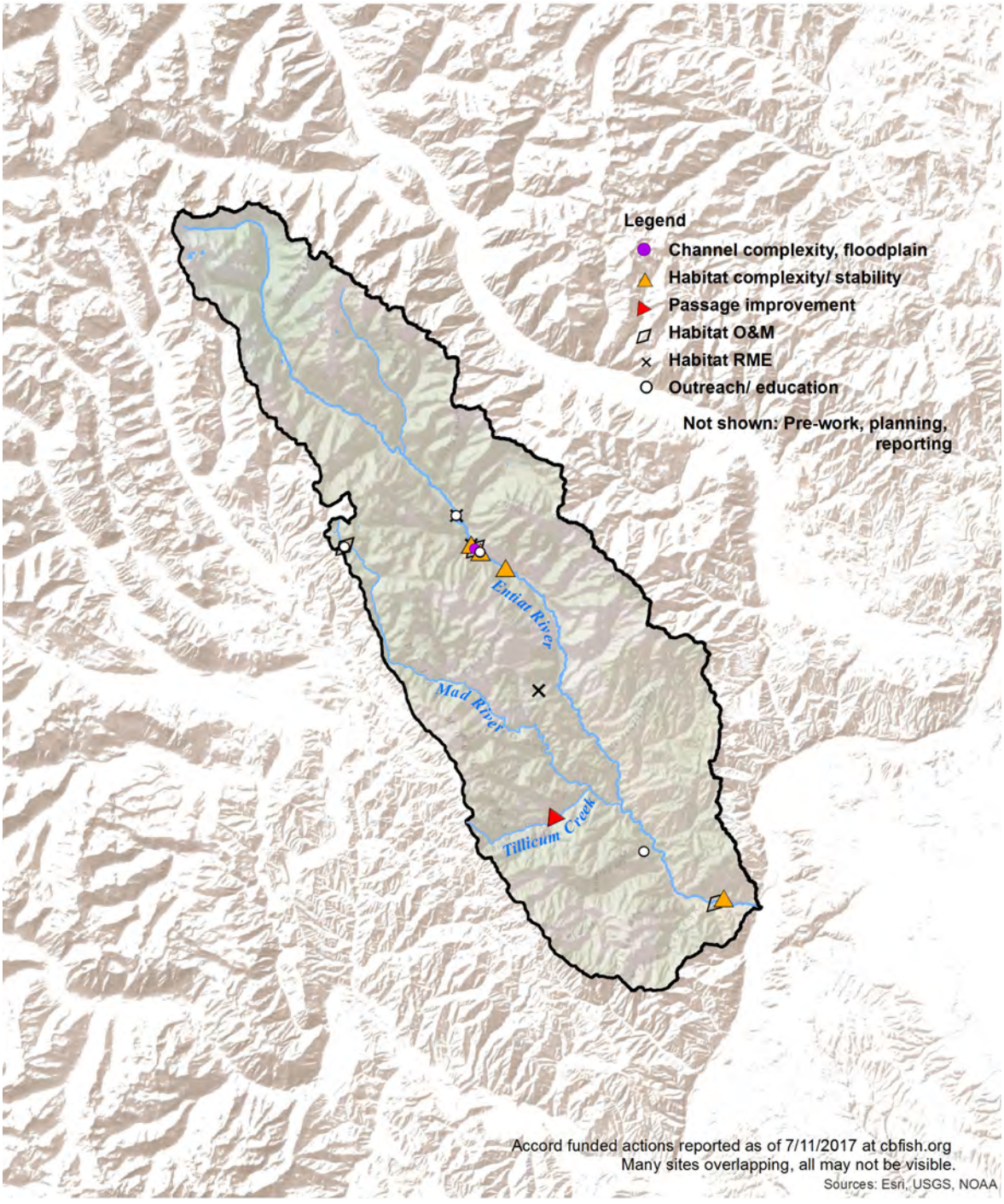
Steelhead Escapement Estimate, Natural and Hatchery



Upstream from Tumwater Dam. Expanded redd counts 2001-2013, mark-recapture 2014–present. Source: Hillman, T., et al. 2017. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2016 Annual PUD Report. (www.gcpud.org)

(*Photo Credit: Tony Grover, Flickr*)

Accord-funded Habitat Actions Implemented from 2008 to 2017



ECOLOGICAL CONCERNS IN THE ENTIAT SUBBASIN

Ecological Concern	YN Addressing*
Floodplain condition	◒
Instream structural complexity	◕
Riparian vegetation	◐
Increased sediment quantity	◕
Bed and channel form	◕
Decreased water quantity	◒
Altered primary productivity**	○
Man-made barriers	◒
Mechanical injury	○
Side channel/wetland conditions	◒
Increased water quantity**	◒

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

Keystone Canyon large wood material project (YN)

**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

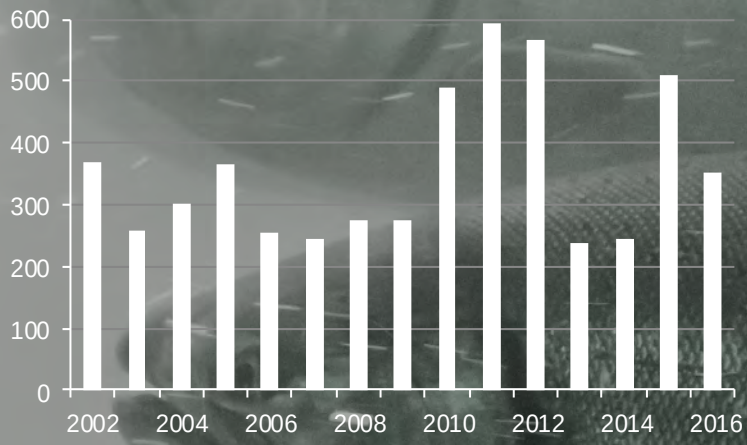
- 28 log/ rootwad structures installed
- 300 boulder structures installed
- 3.25 miles of stream improved

**BPA-funded metrics reported to cbfish.org 1/1/2008- 07/11/2017*

SPECIES STATUS

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 Escapement Estimate, Natural and Hatchery



Based on redd expansion. Source: Fraser, G. And C. Hamstreet 2017. Chinook Salmon spawning ground surveys on the Entiat River, 2016. (www.fws.gov)

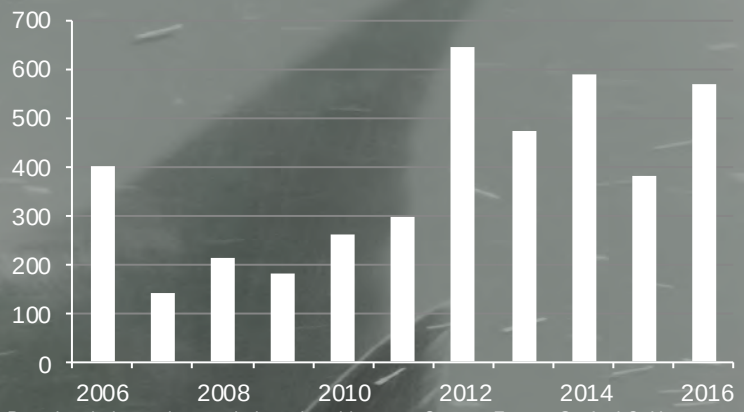
Spring Chinook

- 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 Chinook Escapement Estimate, Natural and Hatchery

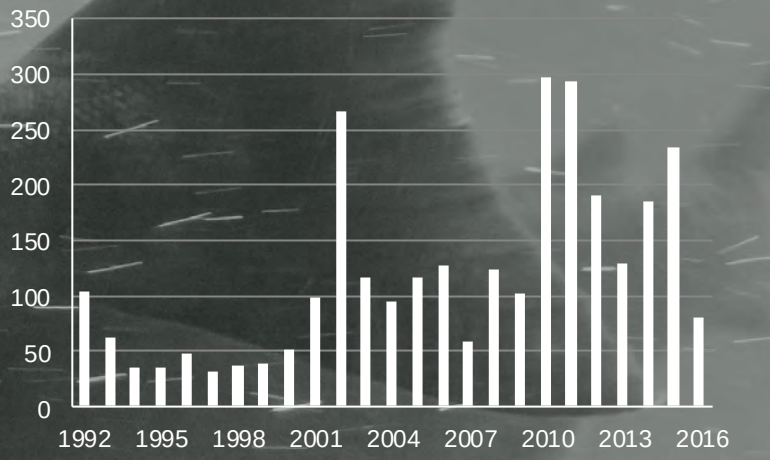


Based on index and expanded reach redd counts. Source: Fraser, G. And C. Hamstreet 2017. Chinook Salmon spawning ground surveys on the Entiat River, 2016. (www.fws.gov)

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

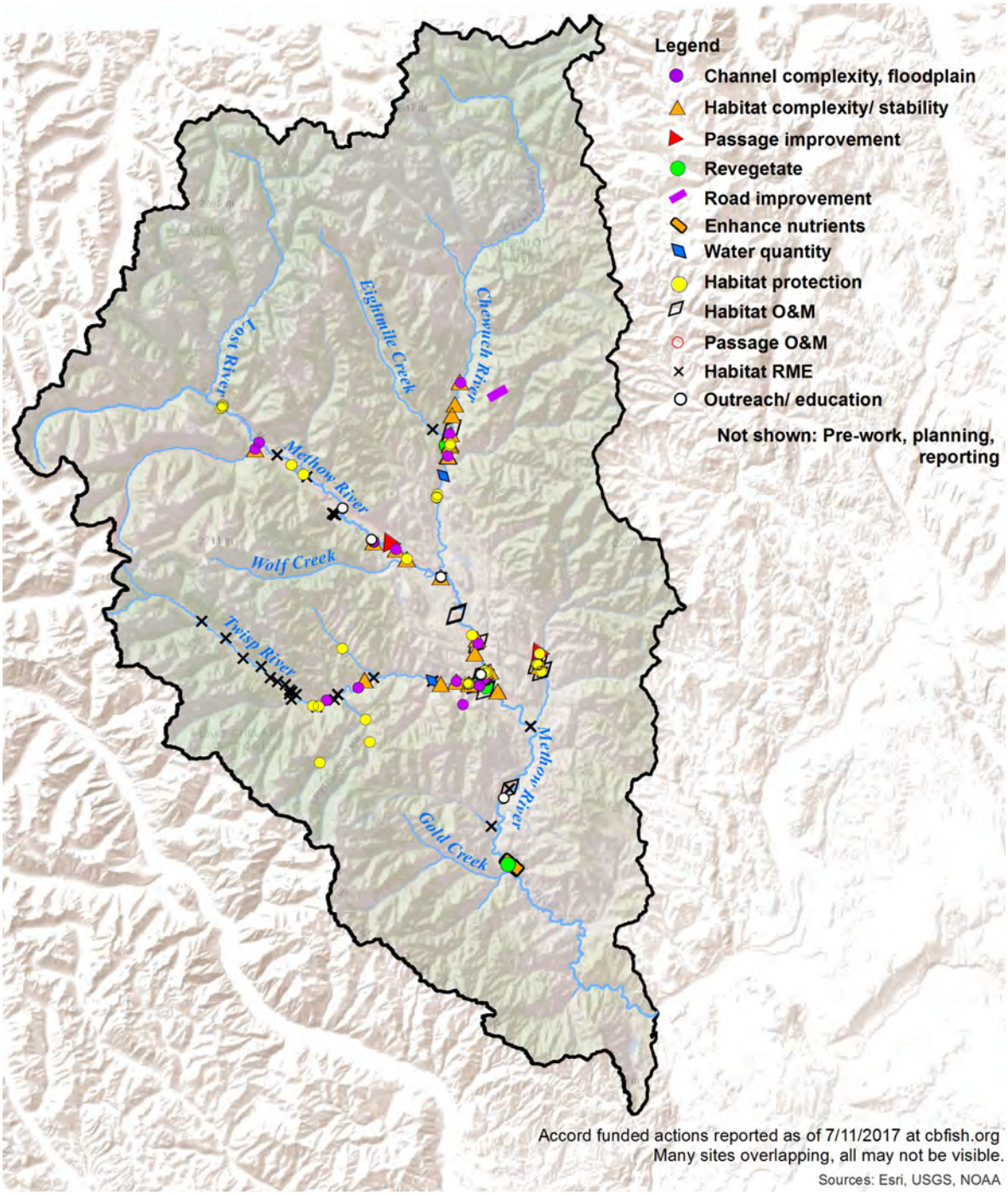
Natural-Origin Steelhead Spawning Escapement Estimate



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)

(*Photo Credit: Tony Grover, Flickr*)

Accord-funded Habitat Actions Implemented from 2008 to 2017



ECOLOGICAL CONCERNS IN THE METHOW SUBBASIN

Ecological Concern	YN Addressing*
Increased sediment quantity	◕
Instream structural complexity	◕
Side channel/ wetland	◐
Decreased water quantity	◐
Bed and channel form	◐
Riparian vegetation	◕
Man-made barriers	◔
Altered primary productivity	◔
Floodplain condition	◐
Temperature	◕

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

Juvenile salmonids rearing in a restoration site in Twisp River. (YN)

**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.*

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 Methow Subbasin.

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

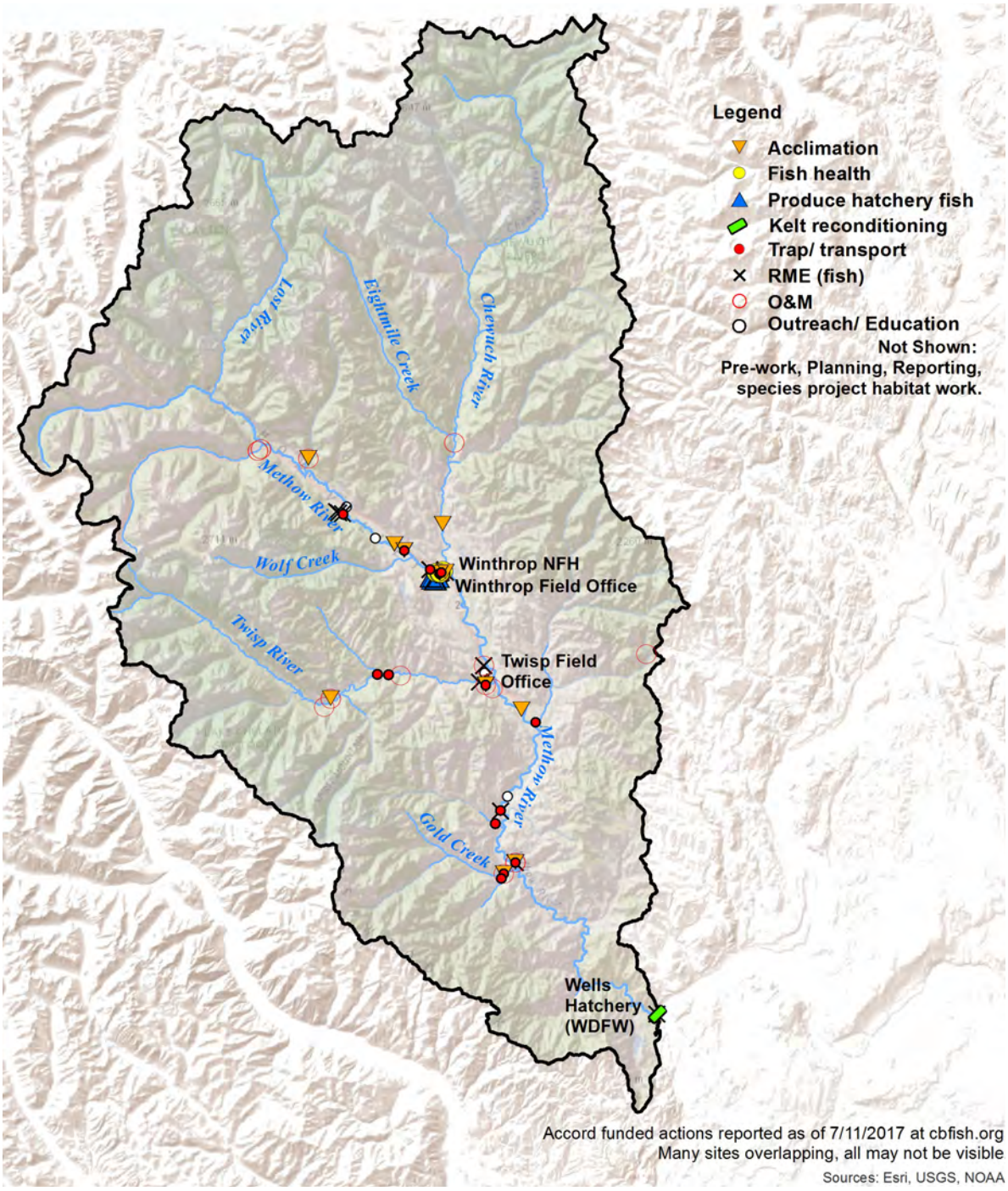
- 31 structures installed
- 17 logs installed
- 17 pools created
- 4.7 miles of stream improved
- 6 exclusion structures installed
- 161 beavers released
- 1.76 miles of stream channel created

Outreach

- 1,100 people contacted

**BPA-funded metrics reported to cbfish.org 1/1/2008- 07/11/2017*

Accord-funded Production Actions Implemented from 2008 to 2017



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.

Upper Columbia kelt reconditioning (YN)

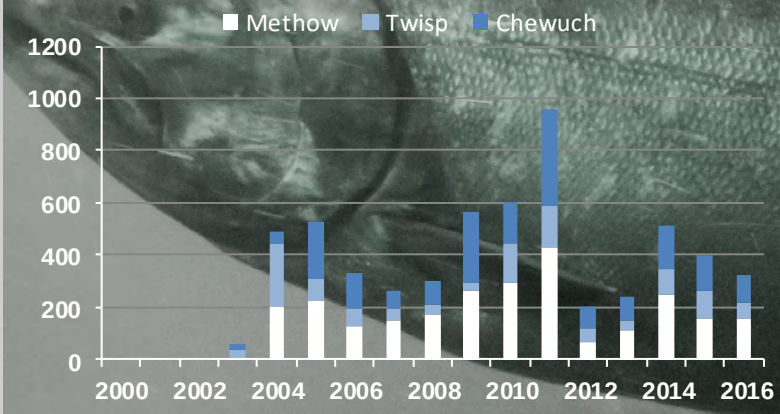
Winthrop National Fish Hatchery USFWS)

METHOW SUBBASIN

SPECIES STATUS

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

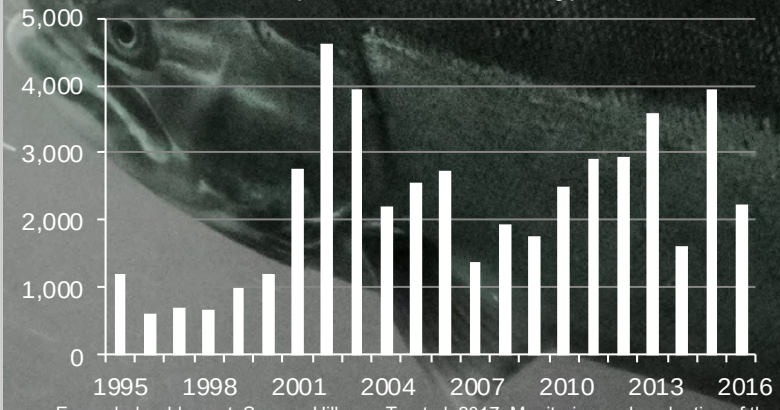


Expanded redd count. Source: Snow, C., et al. 2017. Monitoring and evaluation of the Wells Hatchery and Methow Hatchery programs: 2016 Annual PUD Report (DRAFT). (www.douglaspud.org)

Spring Chinook

- 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)



Expanded redd count. Source: Hillman, T., et al. 2017. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2016 Annual PUD Report. (www.gcpud.org)

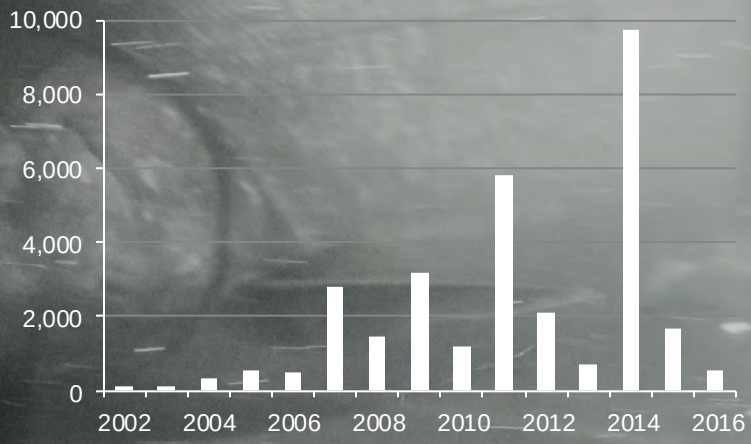
Summer Chinook

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

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)

Coho Escapement Estimate (Natural and Hatchery)

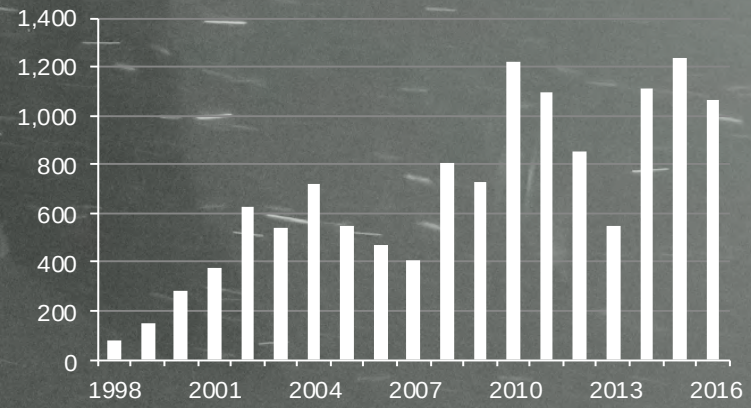


Wells Dam counts and Wells broodstock collected (except in 2002-2003) Source: Ishida et al. 2016. Mid-Columbia Coho Reintroduction Feasibility Study. BPA Project # 1996-040-00 (cbfish.org)

Steelhead

- 127 kelts released by the Yakama Nation (2012-2016)
- On average, 506 more natural origin spawners annually 2008-2016 versus 1999-2007

Natural-Origin Steelhead Spawning Escapement Estimate



Based on expanded redds and PIT tag studies. Source: Snow, C., et al. 2017. Monitoring and evaluation of the Wells Hatchery and Methow Hatchery programs: 2016 Annual PUD Report (DRAFT). (www.douglaspud.org)

(*Photo Credit: Tony Grover, Flickr*)

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:

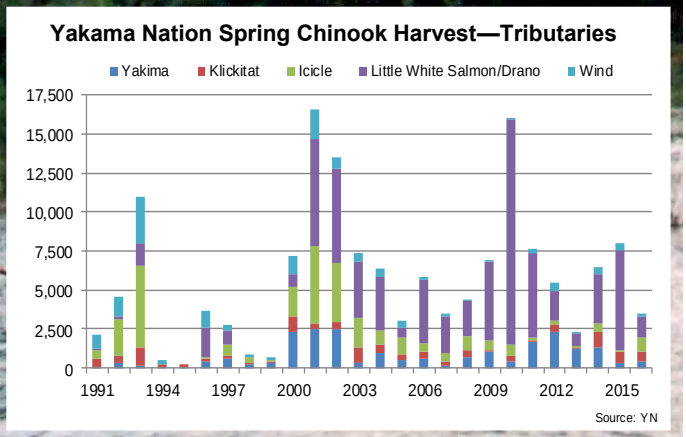
- 800 foot perennial groundwater alcove connected to existing oxbow pond
- 8 wood structures and scour pools installed
- Revegetated riparian areas
- 2 wetland benches created
- 200 cubic yards of trash removed

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)

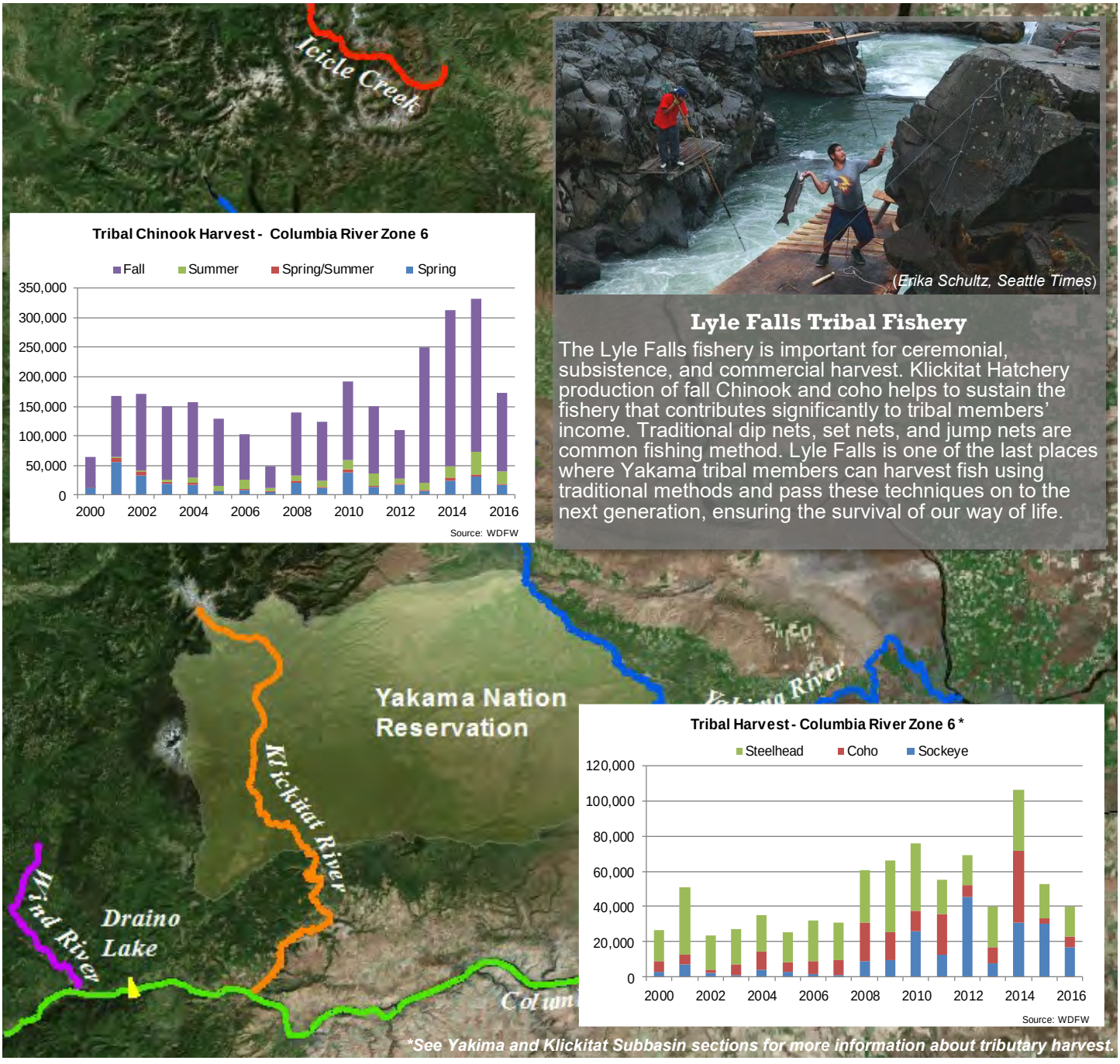
- More than 2 million salmon and steelhead harvested (total, Zone 6)
- Record coho harvest in 2014
- Average of 105,655 more fish caught per year than in 2000-2007 (Zone 6)
- Average of 17,993 more sockeye harvested annually than during 2000 to 2007 (Zone 6)



Icicle Creek Chinook fishery, mid 1990's (YN)

OVERVIEW

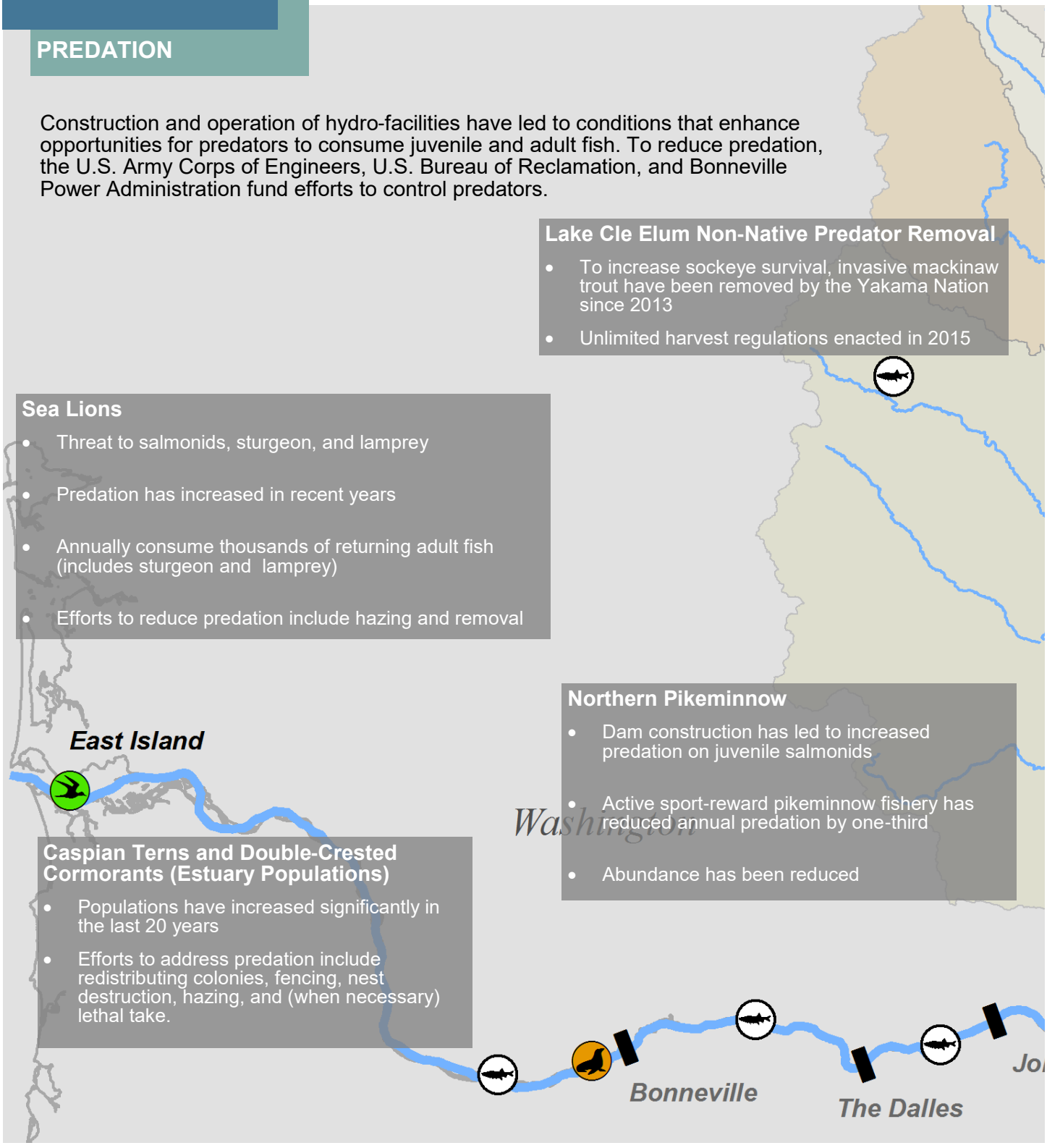
In the Treaty of June 9, 1855, the Yakama Nation reserved the right to maintain its culture and the natural resources on which its culture depends, including rights to water, land, and natural foods and medicines at all usual and accustomed places. Subsequent federal court rulings assured the Yakama 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.

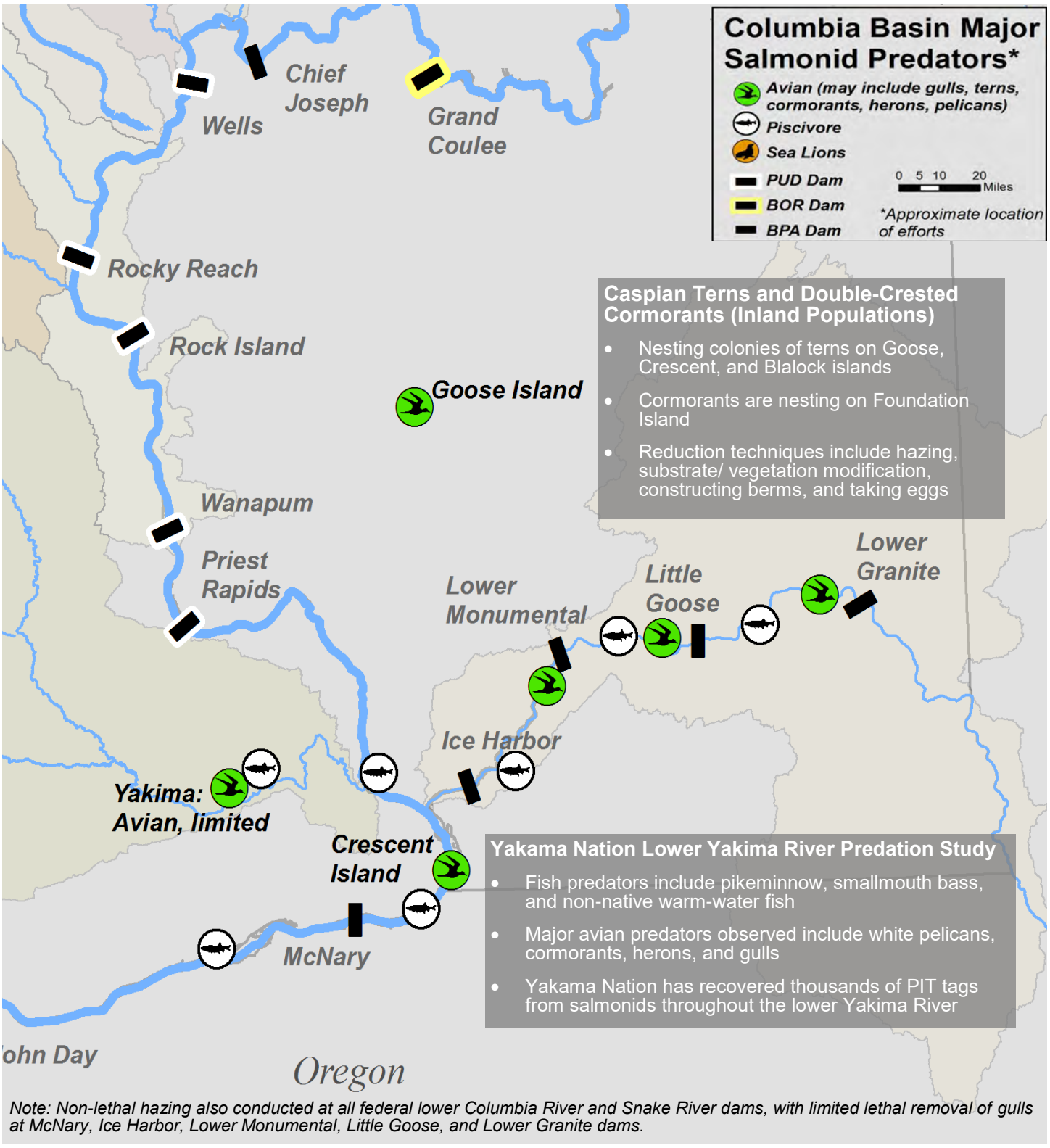


*See Yakima and Klickitat Subbasin sections for more information about tributary harvest.

PREDATION

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.

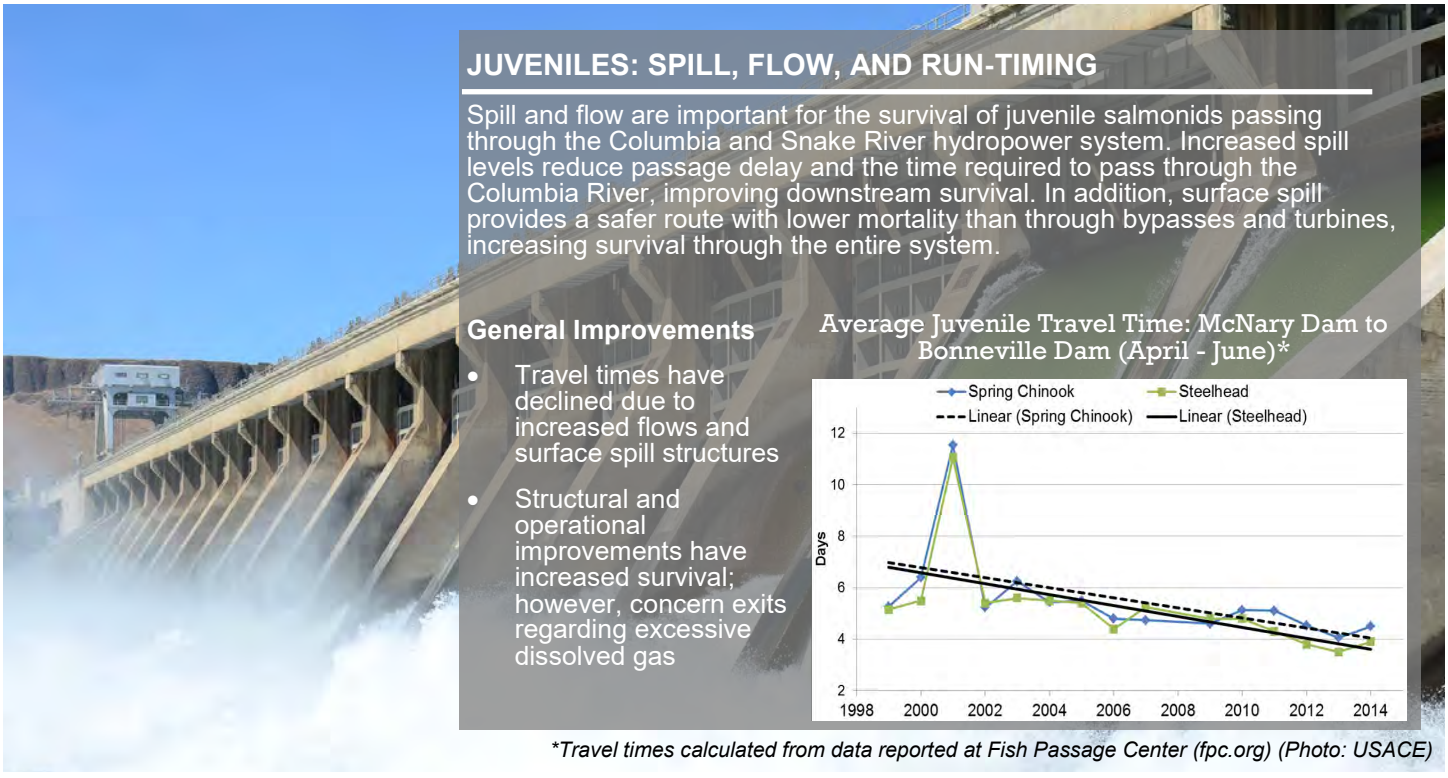




Note: Non-lethal hazing also conducted at all federal lower Columbia River and Snake River dams, with limited lethal removal of gulls at McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams.

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 exits 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

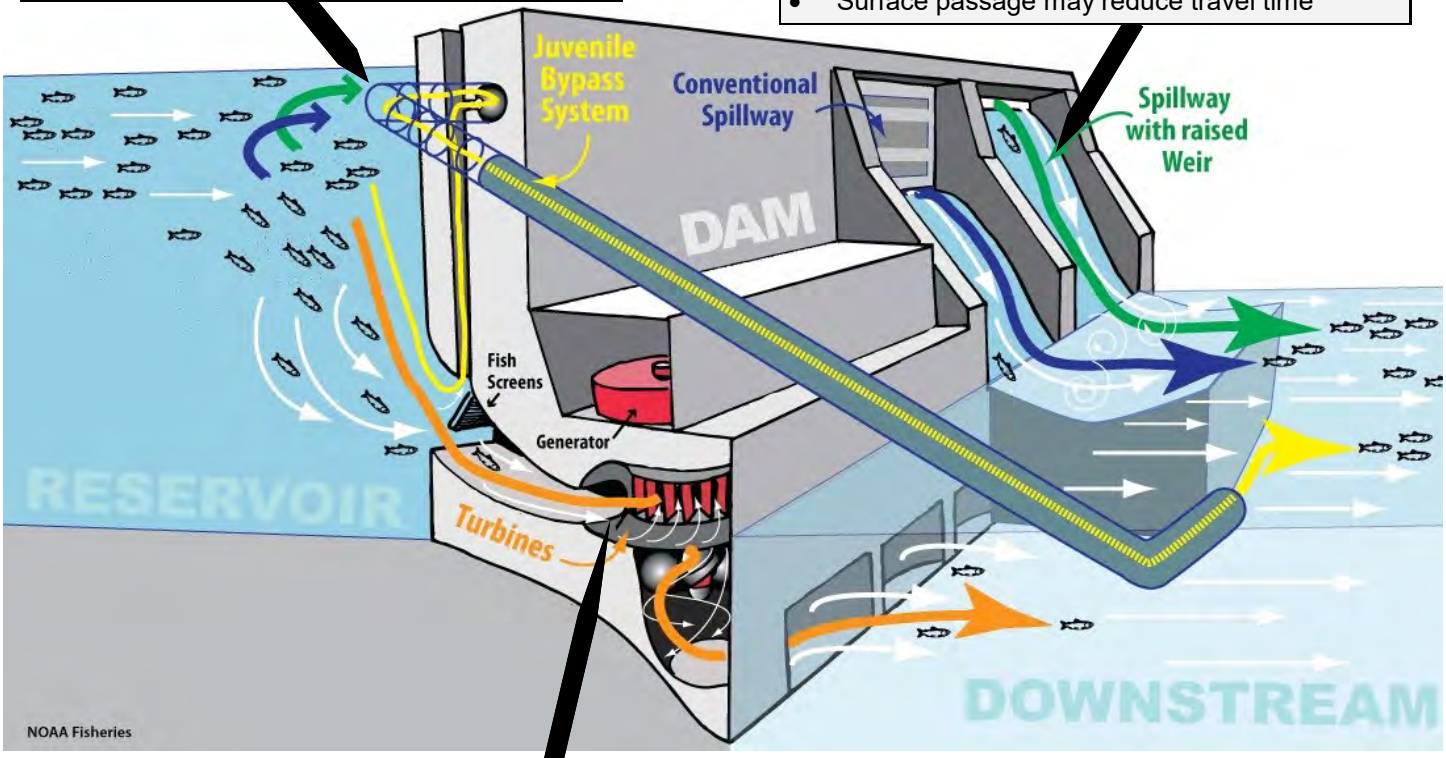
Hydro-facility designs can cause increased mortality. Through the 2008 BiOP and Accord Agreement, some issues are being addressed. The modifications may have contributed to whole-system survival improvements (Snake River spring migrants) of 4% for Chinook, 13% for steelhead, and 16% for sockeye (1999-2008 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

RECENT PASSAGE IMPROVEMENT PROJECT FOR ADULT SALMONIDS

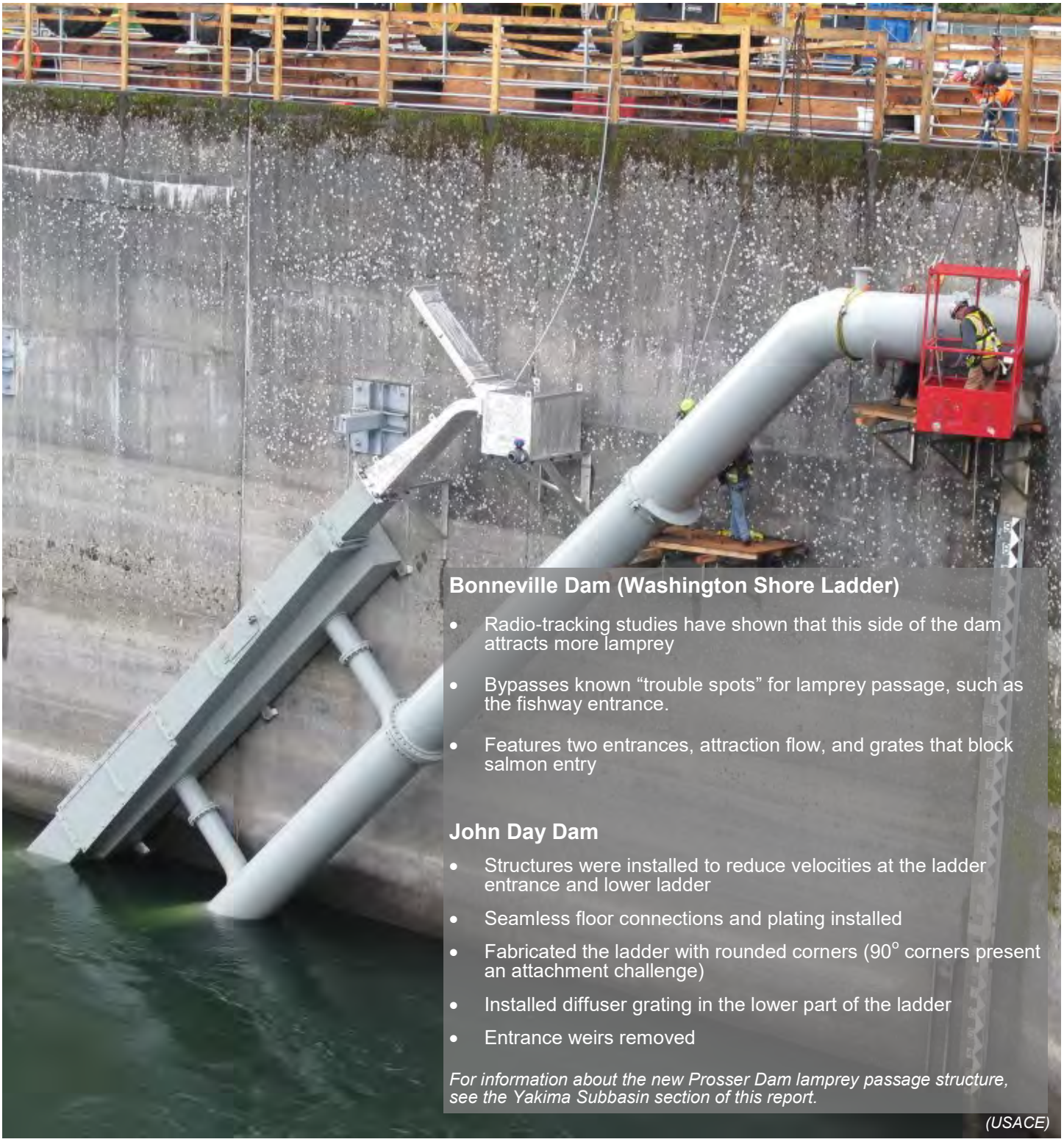
Temperature Improvement at Lower Granite Dam

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

(USACE)

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.

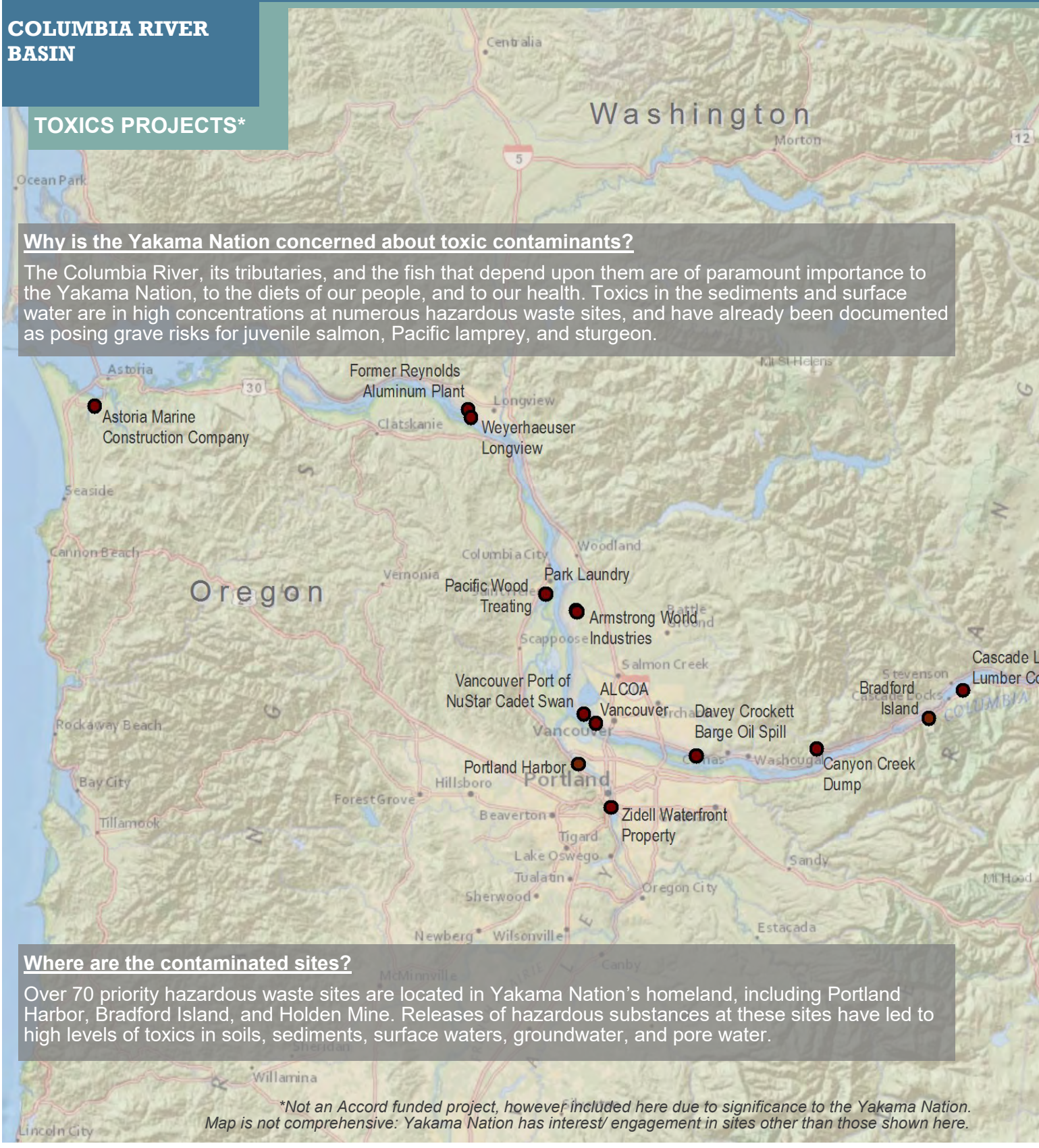
(USACE)

COLUMBIA RIVER BASIN

TOXICS PROJECTS*

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?

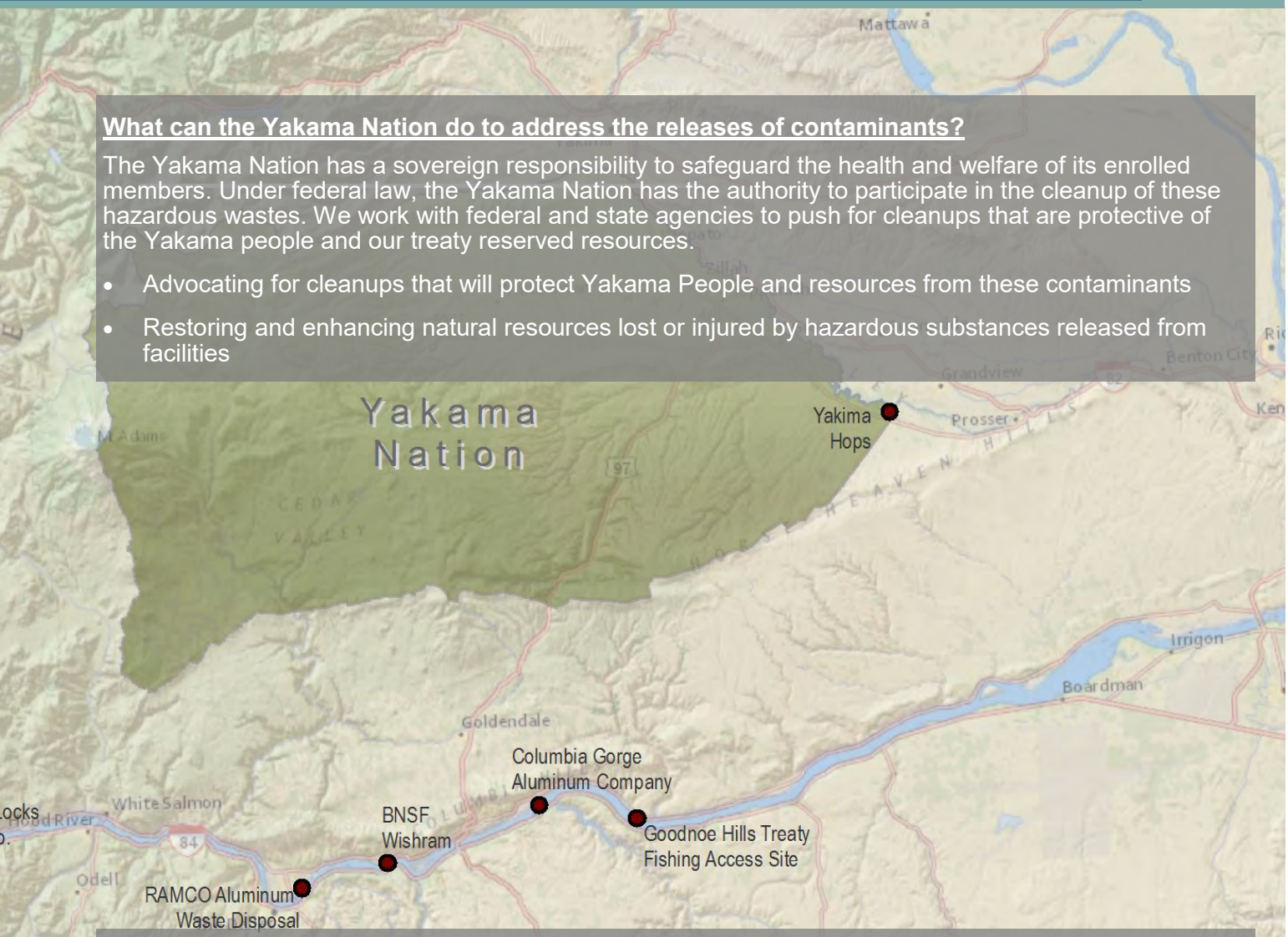
Over 70 priority hazardous waste sites are located in Yakama Nation's homeland, including Portland Harbor, Bradford Island, and Holden Mine. Releases of hazardous substances at these sites have led to high levels of toxics in soils, sediments, surface waters, groundwater, and pore water.

**Not an Accord funded project, however included here due to significance to the Yakama Nation. Map is not comprehensive: Yakama Nation has interest/ engagement in sites other than those shown here.*

What can the Yakama Nation do to address the releases of contaminants?

The Yakama Nation has a sovereign responsibility to safeguard the health and welfare of its enrolled members. Under federal law, the Yakama Nation has the authority to participate in the cleanup of these hazardous wastes. We work with federal and state agencies to push for cleanups that are protective of the Yakama people and our treaty reserved resources.

- 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



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.

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)*
- *Section 1002(a)(2)(A) of the Oil Pollution Act of 1990 ("OPA"), 33 U.S.C. § 2702(a)(2)(A)*

Funding provided by the Bonneville Power Administration, under Status and Trends Annual Reporting Project, #2009-002-00