



A publication of the Northwest Indian Fisheries Commission

Northwest Treaty Tribes

Protecting Natural Resources for Everyone

Winter 2016/17
nwtreatytribes.org

Inside:

- **Following Salmon from Ocean to Table**
- **Oyster Restoration Boosts Ecosystem**
- **Tribes Examine Threats to Water Quality**
- **Climate Change Challenges Mountain Goats**
- **Tribal Coho Salmon Fisheries Limited**
- **Salmon Repopulate Upper Elwha Watershed**



Water Quality Standards Updated



by Lorraine Loomis
NWIFC Chair

It took a long time on a rough road to get here, but today Washington has some of the most protective water quality standards in the nation.

The U.S. Environmental Protection Agency (EPA) recently finalized updated water quality standards that will reduce toxic chemicals in our state's waters. That means our water will be cleaner and our health will be better protected from pollutants in the fish and shellfish we eat.

Tribal, state and federal government, environmental groups and industry wrestled with updating the standards for more than 20 years, but the results are something we can all feel good about.

Water quality standards are based mostly on how much fish and shellfish we eat. The more we eat, the cleaner the water must be. Two numbers drive the standards: our fish consumption rate and our cancer risk rate from eating local seafood.

For the last 25 years, the state has used a fish consumption rate of only 6.5 grams per day – about one big bite – to determine water quality standards.

The state has increased the fish consumption rate to a more realistic 175 grams or about 6 ounces per day. The increase is a significant step forward even though studies show that tribal members, Asian and Pacific Islanders and many others eat much more than that per day.

Thankfully, one thing that didn't change was Washington's one in one million cancer risk rate from eating fish and shellfish from our waters.

The new standards more strictly regulate some of the most toxic chemicals in our waters such as PCBs, arsenic and mercury. These three chemicals are responsible for most fish consumption

health advisories in the state.

Of course, it's cheaper and more effective to keep pollution out of our water to begin with. These updated standards provide a strong incentive for the tribal, state and federal partners to reduce pollution at the source.

Industry has long opposed updating our water quality standards because they say it will increase their cost of doing business. But we believe that you cannot put a price on human health and that a pollution-based economy cannot be sustained.

As Gov. Jay Inslee once said: "We will not fall victim to the fear mongers who have attempted to block every clean-air and clean-water law since Earth Day 1970 by arguing we cannot have a healthy environment and a healthy economy. They have been wrong every time."

In the coming months, the state will be working to find the right balance of flexibility to help industry and municipal wastewater dischargers implement the new standards.

Both the EPA and the state have shown strong leadership in updating our water quality standards after so many years of delay. EPA clearly recognizes the federal government's trust responsibility to protect the health and treaty rights of the tribes, which benefits everyone who lives here.

This is the kind of leadership needed to protect all of our health as well as the economy and environment for the long term.



Northwest Treaty Tribes

Protecting Natural Resources For Everyone

**Northwest Indian
Fisheries Commission
6730 Martin Way E.
Olympia, WA 98516
(360) 438-1180**

Northwest Treaty Tribes is a publication of the Northwest Indian Fisheries Commission and published quarterly. Free subscriptions are available. This edition is online at nwtreatytribes.org. Articles in *Northwest Treaty Tribes* may be reprinted.

NWIFC Chairman Emeritus

Billy Frank Jr.

NWIFC Chair

Lorraine Loomis

Executive Director

Justin Parker

**Communication Services
Division Manager**

Tony Meyer

Regional Information Officers

Emmett O'Connell, South Sound
Tiffany Royal, Hood Canal/
Strait of Juan de Fuca
Kari Neumeier, North Sound

NWIFC Member Tribes:

Hoh, Jamestown S'Klallam, Lower Elwha Klallam, Lummi Nation, Makah, Muckleshoot, Nisqually, Nooksack, Port Gamble S'Klallam, Puyallup, Quileute, Quinault Indian Nation, Sauk-Suiattle, Skokomish, Squaxin Island, Stillaguamish, Suquamish, Swinomish, Tulalip and Upper Skagit

Tribal contact information is available under Member Tribes at nwtreatytribes.org.

Follow us: Facebook: [facebook.com/nwtreatytribes](https://www.facebook.com/nwtreatytribes)

Twitter: [@nwtreatytribes](https://twitter.com/nwtreatytribes)

Instagram: [@nwtreatytribes](https://www.instagram.com/nwtreatytribes)

On the cover:

Ernest "Sonny" Sampson, Lower Elwha Klallam Tribe, releases a surplus chum salmon into the Elwha River. See related story, page 14.

Photo: T. Royal

Students Follow Salmon from Ocean to Table



T. Royal (3)

Left: Chief Kitsap Academy student Ben Beckwith helps harvest a chum salmon with the help of Suquamish tribal fishermen. Above: Classmate Keilah Andrews tosses a salmon into a tote aboard the *Stephie J.*

Ben Beckwith, a blond-haired and bespectacled sixth-grader, may only be 12 years old, but his enthusiasm for harvesting salmon matched the size of the burly Suquamish Tribe fishermen he worked alongside on the *Stephie J.*

“Get ready, here’s another one coming!” Beckwith yelled, tossing a large adult chum salmon across the deck to his Chief Kitsap Academy classmates on board. One of them scooped up the fish and tossed it in a large blue tote.

The kids, participating in the school’s Ocean to Table program, were experiencing what it takes to be a tribal fisherman in Puget Sound. That includes donning oversized yellow rain slickers and orange gloves to handle the slippery fish on this rainy October morning.

With the help of tribal fishermen, tribal council members, teachers and peers, the middle-school and high-school students received a week of messy, hands-on opportunities to learn how salmon get from ocean to table.

“We’re making them do the work and they’re really engaged,” said Lucy Dafoe, the school’s principal. “They’re fishing, gutting, filleting and really learning. I love listening to the laughter and interactions too.”

The harvested fish were taken to Suquamish Seafoods where the students learned how to fillet a salmon either by using the seafood company’s auto-fillet machine or the traditional way, by hand. The fish were then cut into 4-inch-wide strips and placed in a dry brine overnight.

The next day the kids rinsed the fish

and hung them, six at a time, on 18-inch-long cedar sticks. The fish dripped dry for a few hours before being placed in the smokehouse.

After the fish smoked for four days, the students visited the tribe’s Kiana Lodge kitchen, where general manager Jay Mills taught the kids how to can the smoked salmon. The cans were distributed to elders during Thanksgiving week; the rest vacuum sealed for gifting later.

Mills and the teachers made certain the kids did each step correctly to prevent contamination.

“After all this hard work, you don’t want to screw it up at this point,” Mills said.

While some of the students had never canned fish before, others were well-versed from canning with their families for years.

“For me, it’s learning about culture,” said Keilah Andrews, who has family from Nooksack. “I have some native relatives so this will allow me to connect with them on another level.”

“I’ve done this numerous times with family,” said Talon Capoeman-Williams, Quinault. “It’s fun because I know how to do this, so I can show them and explain it in a way they would understand.”

The school is working to ensure the activities are not a one-time event, Dafoe said.

“We do a clam bake monthly and had the kids experience a sweat lodge,” she said. “But we want to make sure we repeat these activities so they learn from them and their skills remain sustainable.”

– T. Royal



Students learned to harvest, fillet, brine, smoke and can salmon over the course of a week.

Olive Shells Recovering Following 2014 Die-off

It looks like child's play when 13-year-old Tyrone Chambers throws a hula hoop in the air and lets it fall on Hobuck Beach.

But the Makah fisheries intern is using it to conduct purple olive shell surveys. After it lands, he takes note of the location in his GPS, then bends down and starts digging in the sand within the hoop, coming up with handfuls of the shells.

"Oh man, this is going to be a lot to count," he says, as he unearths more shells of various sizes with every handful.

Chambers is helping Jonathan Scordino, the tribe's marine mammal biologist, with the annual olive shell survey conducted since 2009 on the north end of Hobuck.

"We know using the hula hoops is a funny way of gathering data but it allows us to randomly sample the beach and be objective about it," Scordino said.

The data has shown a pretty consistent population since 2009, except 2014 when there was a mass die-off.

"The counts in 2015 and 2016 show that the snail population has recovered," he said. "However, it is worth noting that the average size of live olive shells declined after the mortality event and it was much less common in 2015 and 2016 to find large olive shells (about an inch long) than it was prior to the mortality event."

The smooth glass-like shells are important to the tribe because they have been used for at least 500 years as décor on traditional regalia.

Back at Chambers' digging spot, he had to dig a few inches deeper to count as many of the shells as possible within the hula hoop. His final count: 467.

"Well, I'll probably beat Jon's count now," he said. – *T. Royal*



T. Royal (3)

Clockwise from above: Tyrone Chambers, a Makah fisheries intern, tosses a hula hoop to determine where he will count olive shells. Jonathan Scordino, Makah marine mammal biologist, measures an olive shell, a species unique to Northwest beaches that is used by coastal tribes on their regalia. Chambers counts olive shells in a sample area on Hobuck Beach.





Oyster Project Aims to Boost Ecosystem Resilience

The Swinomish Indian Tribal Community is enhancing native Olympia oyster beds with the hope of restoring the ecosystem they once supported.

“When native oysters grow and oyster beds slowly develop, we hope the ecosystem will return as well,” said Julie Barber, Swinomish senior shellfish biologist. “Maybe this will make tribal tidelands more resilient in the face of changing ocean conditions.”

Worldwide, 85 percent of oyster reefs have been lost, according to The Nature Con-

servancy, making them “the most imperiled marine habitat on earth.”

Olympia oysters are sensitive to extreme temperatures, so Swinomish focused its efforts on the pocket estuaries at Lone Tree Point and Kukulali Preserve where the oysters would be constantly inundated and could avoid large temperature swings.

“Pocket estuaries are typically surrounded by salt marsh and have tidal channels, lower wave and current energy, and some freshwater input,” Barber said. “Our eventual goal is

to establish self-sustaining populations of native Olympia oysters in these estuaries and ideally, in other areas around Similk and Skagit bays.”

Oyster larvae settle and grow on adult shells or “cultch.” In 2012 and 2013, Swinomish staff distributed Olympia oyster seed set on Pacific oyster cultch at Lone Tree and Kukulali. In 2015, they planted individual oysters. All seed was bred from Fidalgo Bay broodstock.

Because the goal is for the oysters to spawn and self-seed, the tribe needs to know when reproductive activity typically occurs in each location. Fisheries staff monitored activity through spring and summer 2015, also collecting data on water temperature and salinity.

The research team used non-lethal methods to assess brooding status. Oysters were briefly dried out and inspect-

ed. A 5-millimeter-wide zip tie was used to gently sweep the inside of the mantle to extract larvae to determine the development stage. The oysters were then placed in a seawater bath before being returned to the pocket estuary.

“Our research clearly shows that Olympia oysters are capable of brooding at temperatures colder than 12.5 degrees Celsius (54.5 degrees Fahrenheit), which is what has been previously reported in the literature,” Barber said. “Furthermore, the presence of late-stage larvae in the mantle of brooding oysters indicates that larvae had successfully reached late-stage development approximately two weeks before 12.5 degrees was first recorded at Lone Tree.”

As a result of the findings, the team will put unseeded cultch in the lagoons earlier than previously scheduled.

– K. Neumeyer



Jim Gibson, Swinomish Tribe (2)

Above: Swinomish senior shellfish biologist Julie Barber and shellfish technician James McArde survey Olympia oysters in the lagoon at Lone Tree Point. Left: Bags of adult oyster shells are placed in the estuary where juvenile oysters will grow on them.

Returning Wood to Rivers Recovers Salmon Habitat

Jamestown S'Klallam Tribe

The Jamestown S'Klallam Tribe is helping salmon and char in the Gray Wolf River by adding logs that fish need for good habitat.

The tribe and Olympic National Forest partnered in planning and implementing the project.

"We used an innovative engineering design, coupled with helicopter delivery of materials to avoid having to use heavy equipment in the river channel," said Hilton Turnbull, the tribe's habitat biologist.

"The idea was to build structures in areas where they would reconnect the river to its adjacent floodplain, allow anchoring points for additional wood moving through the system, and also provide refuge for fish to escape the main channel during higher flows," he said.

Salmon habitat in this area was degraded by wood removal projects in the 1960s and never recovered, said Randy Johnson, the tribe's habitat program manager.

"Logjams are naturally reforming in the river but slowly," Johnson said. "We want to help out the imperiled fish a bit – chinook, steelhead and bull trout, all of which are on the Endangered Species Act list, plus coho and pink."

This is a fast-flowing powerful river as evident by the cobblestone river banks, Johnson said.

"The logjams will slow the water's velocity and allow for fine sediment and gravel to settle, creating better habitat salmon need for laying eggs," he said. – *T. Royal*



T. Royal

A field crew observes a log being placed in the Gray Wolf River.

Nooksack Tribe



Eric Stover, Nooksack Tribe

A construction crew builds an engineered logjam in the South Fork Nooksack River.

The Nooksack Tribe improved salmon habitat on both the North and South Forks of the Nooksack River last summer.

Upstream of Acme, the tribe led a project to construct 20 logjams in the South Fork Nooksack River to restore habitat for imperiled spring chinook salmon.

The goal is to increase the

number of pools where adult and juvenile salmon can hide and rest. The tribe hopes that the deeper pools of water will be cooler than elsewhere in the South Fork, where high temperatures can stress or kill salmon.

The tribe also completed 16 logjams in the North Fork Nooksack River upstream of Kendall, to restore stable side

channels for chinook spawning.

"Chinook recovery is a top priority for the tribe," said Gary MacWilliams, director of the tribe's natural resources department. "We haven't had a directed commercial fishery on native Nooksack spring chinook since the early 1980s. There has been substantial habitat degradation over the

past century, and our spring chinook have suffered. These habitat restoration projects will help reverse the decline."

So far the tribe has completed 17 projects in the North and South Forks of the Nooksack River. Tribal staffers find willing landowners, then work with engineers and scientists from consulting firms to design each project. The design process involves a series of engineering, hydraulic modeling and geomorphic analyses to ensure that logjams will be stable and effective, and not increase risk of flooding for adjacent landowners. The tribe takes public safety and maintaining positive landowner relationships very seriously, MacWilliams said.

"Salmon are such an important food, economic and cultural resource, not just for the tribe but for everyone," he said. – *K. Neumeyer*

Study Narrows Causes of Pre-Spawn Death



Jessica Lundin, an ecotoxicology post-doctoral researcher at NOAA, samples blood from a coho salmon.

T. Royal

Scientists overseeing the Grovers Creek coho salmon stormwater experiment are closer to determining what kills salmon exposed to polluted runoff.

“It’s a ‘rule out’ year,” said Jen McIntyre, a toxicologist with Washington State University (WSU) who has been leading the project the past few years. “We’re doing more intensive blood and tissue analysis this year to narrow down possible causes of death.”

Last fall at the Suquamish Tribe’s Grovers Creek Hatchery, the Puget Sound Stormwater Science Team exposed adult coho salmon to either unfiltered stormwater runoff collected from a highway in Seattle, or well water. The team consists of scientists from WSU, University of Washington, National Oceanic and Atmospheric Administration (NOAA) and U.S. Fish and Wildlife Service (USFWS).

Over a four-week period, a total of 61 adult coho were exposed to the road runoff. One half were sampled after 30 minutes of exposure; the others a few hours later when they showed advanced symptoms of pre-spawn mortality (PSM). Another 61 salmon were exposed to well water from the hatchery and sampled at the same intervals.

Organs – including gills, heart and kidney – were preserved for later testing. Blood samples were tested on site at the hatchery in a mobile lab.

“We’re looking at oxygen levels, white blood cell levels, metabolites, proteins, immune responses – indicators of organ failure,” McIntyre said. “We want to see how blood changes over a period of time – at what point in the body does the blood change? Before or after it goes through a particular organ? And how long after exposure does that happen?”

In recent years the team, working with the tribe, has published several peer-reviewed studies showing that most or all of the adverse impacts on species like salmon can be prevented by pre-treating urban runoff with experimental soil columns, such as bioinfiltration or rain gardens, said Jay Davis, a USFWS environmental toxicologist.

“However, if through our studies we are able to isolate the chemical or chemicals that are causing PSM, controlling the source of the compounds is a more effective way to improve water quality and salmon habitat, and thus help recover the species,” he said. – T. Royal

Early Algae Warning to Predict Shellfish Poisoning Outbreaks

The Jamestown S’Klallam Tribe and federal and state agencies are trying to figure out how to predict potential spikes of shellfish poisoning in Washington waters.

The partners are developing an early warning system for harmful algal blooms and shellfish biotoxins, which cause shellfish poisoning.

Staff from the tribe, National Oceanic and Atmospheric Administration, and Washington State Department of Health measured concentrations of marine algae in the water and associated fat soluble toxins in shellfish from 18 sites last summer in Puget Sound, the Olympic Peninsula and the coast.

Biotoxins concentrated in shellfish can cause diarrhetic shellfish poisoning (DSP) and azaspiracid shellfish poisoning (AZP) which result in severe gastrointestinal distress.

In 2011, there were three cases of DSP linked to mussels harvested at Sequim

Bay State Park. Since then, the tribe has been monitoring for DSP and looking for the type of algae that causes it, said Neil Harrington, the tribe’s environmental biologist. The state integrated DSP monitoring into its routine biotoxin monitoring for recreational and commercial shellfish harvest in 2012.

The partners also are looking at concentrations of the toxic algae that produces AZP and the associated biotoxin in shellfish.

Little is known about AZP in the United States, but the causative organism has been found in Puget Sound waters, and the associated toxin has been found in extremely low levels in shellfish in recent years, Harrington said.

“Study results will allow a program to be put into place to prevent any cases of AZP and safeguard our shellfish supply,” Harrington said. – T. Royal



T. Royal

Jamestown S’Klallam Tribe environmental biologist Neil Harrington samples water from Sequim Bay.



K. Neumeyer (2)

Preserving ‘Place of Mountain Huckleberries’

The Tulalip Tribes are caring for huckleberry fields in the Mount Baker-Snoqualmie National Forest to ensure the resource remains available for future generations.

Earlier this year, as part of the 2007 government-to-government agreement with the U.S. Forest Service, Tulalip signed a 10-year co-stewardship plan for a 1,280-acre parcel known in the tribal language as *swəda?xali*, meaning “Place of Mountain Huckleberries,” in the upper Skykomish watershed.

“Huckleberry is a food and medicine to our people,” said Inez Bill, who coordinates the tribes’ Rediscovery Program. “Our ancestors visited cer-

tain areas for gathering these berries. They knew where the berries were growing, and what companion plants were growing there too and how to use them.”

Historically, fire was a forest management tool that prevented trees from shading out huckleberries. The past several decades of fire suppression have allowed conifers to flourish, diminishing opportunities to gather the traditional food.

As part of co-stewardship, Tulalip natural resources staff removed small conifers from the area. At 5,000 feet elevation, the area is home to several species of huckleberry, including big huckleberry, and Cascade or mountain blue-

berry.

The past two summers, Tulalip held a Mountain Camp at *swəda?xali*, where youth lived as their ancestors did. They learned about and participated in huckleberry stewardship, made berry baskets from cedar bark, backpacked for several nights and gathered huckleberries.

The Forest Service had planned to decommission all of the roads leading to the area, but was persuaded to keep one open so tribal mem-

bers could continue to access it for treaty and cultural uses, said Libby Halpin Nelson, Tulalip environmental policy analyst.

“Treaty rights encompass more than an opportunity to pick berries, hunt game or harvest fish,” she said. “Having a meaningful role on the ground, in the stewardship of these resources, helps reconnect tribal peoples to these lands and the teachings of their ancestors.”

– K. Neumeyer

Watch a video from the first year of Mountain Camp: nwtt.co/mtcamp

Above: Phillip Solomon, Tulalip forestry technician, helps clear conifers from a field of huckleberries in the upper Skykomish watershed. Right: The leaves of huckleberry plants are a vibrant red in the fall.



Mountain Goat Recovery at Risk

Mountain goats in the North Cascades have started to rebound over the past several years, but treaty tribes are concerned about the impact of expected climate change on their survival.

The Sauk-Suiattle, Stillaguamish and Tulalip tribes recently put global positioning system (GPS) collars on six mountain goats, with plans to collar an additional 14 in 2017, to better monitor and manage the population. To reach the animals, they needed a permit to land a helicopter and conduct captures in the wilderness of Mount Baker-Snoqualmie National Forest.

“Studying these animals will allow for responsible management, which will ensure that sustainable populations of mountain goats persist into the future, especially in the face of climate change,” the tribal chairs wrote in their request to the Forest Service. Mountain goats are considered especially vulnerable to changes expect-

ed in the next 60-70 years, according to a 2015 assessment conducted for the Stillaguamish Tribe by the Climate Change Impacts Group of the University of Washington.

“We have very little data on how goats are responding to changes in climate, so this is an opportunity to begin collecting data on both their movement and habitat use,” said Jennifer Sevigny, Stillaguamish wildlife biologist.

Traditionally, tribal members collected goat wool in close timing with snowpack melt in the North Cascades.

“One thing we will be looking at with our study is melting times,” said Emily Wirtz, Sauk-Suiattle wildlife biologist. “Early melting times that are forecast with climate change could change the vegetation patterns in the alpine, and affect goat use of the habitat.”

The tribes are working with the Natural Resources Conservation Service to place snow telemetry instruments in the



Jennifer Sevigny, Stillaguamish Tribe

Tribal natural resources staff survey mountain goats by helicopter.

Sauk and Stillaguamish watersheds to monitor temperature and snow depth.

“Another aspect of climate change, coupled with the increasing population of Washington, is that we expect that larger numbers of recreationists will be able to have access to the higher elevations earlier in the year, and stay longer in goat habitat,” said Mike Sevigny, wildlife manager for the Tulalip Tribes. “This will also put added stressors on mountain goat populations and have an effect on goat habitat use.”

Tribal mountain goat harvest in the North Cascades ended in the mid 1980s, following a steep population

decline. Aerial surveys from 2013-2015 estimated more than 100 mountain goats in the Boulder Wilderness area, up from 79 in 2012.

As a result of the increase, in 2015 the Washington Department of Fish and Wildlife issued a tag for the harvest of a single male goat, with the understanding that the nine Point Elliott Treaty Tribes could harvest a billy as well.

“Information from collared goats will allow managers to proceed cautiously with goat management in the wilderness areas,” said Stillaguamish Chairman Shawn Yanity.

– K. Neumeyer



Debbie Preston, Nisqually Tribe

Fishers Return

A fisher makes a beeline for the trees after being released into Mount Rainier National Park. The fisher is one of 10 being reintroduced into the region.

Members of the weasel family, fishers were driven to extinction in western Washington by trappers in the 1950s. The relocation was part of a larger effort to re-establish fishers throughout the Cascade Mountains.

The fishers were trapped on First Nations land near Williams Lake, B.C., and released in part of the park designated for use by the Nisqually Tribe.

HATCHERY MANAGEMENT

Puyallup Transfers Returning Coho

For the first time in decades, an abundant coho run has re-established itself on Clarks Creek in the lower Puyallup River. The Puyallup Tribe has been making sure these returning adults are finding a place to spawn.

Tribal staff built an improvised fish slide at the Clarks Creek Hatchery to move thousands of coho upstream after they found their way to the hatchery pond.

“We just starting seeing thousands and thousands of coho swimming into our ponds,” said Blake Smith, the tribe’s enhancement manager. The tribe moved the fish because its hatchery only spawns chinook salmon.

“We put together a fish tote, a water pump and some extra pipe, and starting moving them upstream,” Smith said.

The tribe also took advantage of the bumper crop by putting hundreds of coho into tanker trucks to seed other nearby streams where there might be better spawning habitat.

“We know juvenile coho are using these lower river tributaries to rear, but we don’t have much evidence of adult coho spawning here,” said Russ Ladley, the tribe’s resource protection manager.

Because of urban development and the increase in impervious surface in the lower Puyallup River watershed, there isn’t a lot of suitable habitat for coho. They are dependent upon high-quality habitat conditions for a full year or more before leaving for the ocean.

“At the very least, if these fish don’t find habitat to spawn in, we know their carcasses will be eaten by aquatic insects that will in turn feed salmon from across the watershed that end up in these lower river tributaries,” Ladley said. – *E. O’Connell*

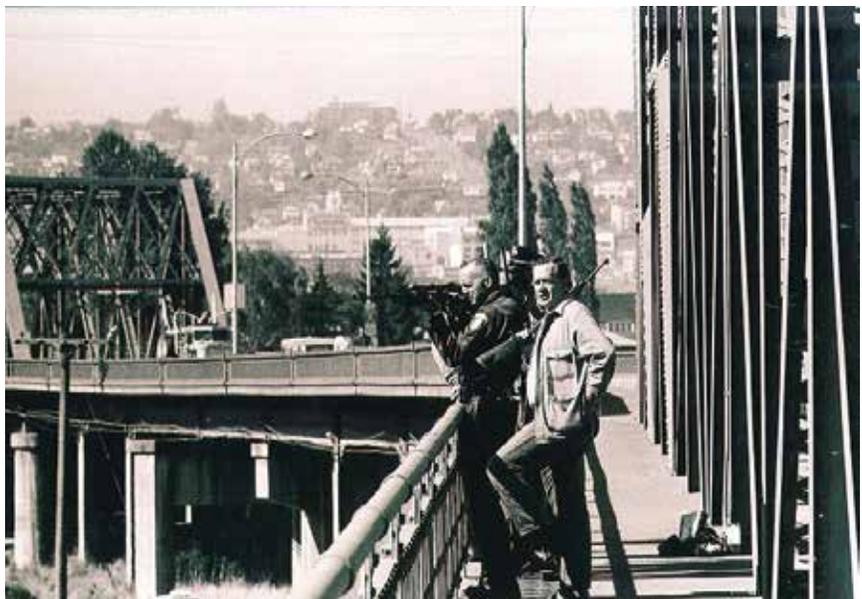


Julian Close, scientific technician for the Puyallup Tribe of Indians, loads a tanker truck with adult coho salmon.

E. O’Connell

GENERATIONS

Armed state law enforcement officers stand on the Puyallup Avenue Bridge, drawing down on the fishing encampment below in September 1970, during one of the most sensitive times of the Fish Wars, before the 1974 Boldt decision.



Courtesy of the Puyallup Tribe

Tribes Ensure Salmon Find Diverse Habitat

Squaxin Island Tribe

Coho salmon don't like high water temperatures.

"Warm water can be directly lethal to salmon," said Sarah Zaniewski, Squaxin Island Tribe's salmon biologist. "Even if they don't die immediately, salmon certainly become less fit and are more likely to die before they reach adulthood."

The tribe conducted a series of snorkel surveys throughout Skookum Creek in late summer and early fall, looking for locations where juvenile coho could be found.

A few years ago the tribe used Forward Looking Infrared Radar (FLIR) to map stream temperatures throughout the Skookum watershed, allowing researchers to map every square foot of surface water. The tribe found several locations where cooler water could provide refuge for salmon.

During the 2016 snorkel surveys, the tribe found coho living in each one of

those refuges.

"No matter how good the habitat was otherwise, if the water was too warm, the fish wouldn't be there," Zaniewski said.

Much of Skookum Creek flows through active agricultural land, which lacks the streamside trees that shaded the creek historically.

Like many South Sound streams, Skookum Creek is considered impaired by state and federal standards because of high temperatures.

The treaty tribes aggregated stream gauge data in the recently released State of Our Watersheds Report.

One reason for lower flows and higher temperatures is the proliferation of permit-exempt wells. State law allows new wells to withdraw groundwater up to 5,000 gallons a day without obtaining a permit.

"Every year, a dozen or so of these new wells come online in the South Sound," Zaniewski said.

With streams in the tribe's treaty-

reserved fishing area facing the impacts of climate change, cold water refuges will become increasingly important, she said.

Nisqually Tribe

Quick thinking and some emergency funding from the Nisqually Tribe ensured that an almost decade-old logjam did not wash away on the Mashel River.

Logjams create habitat diversity that is important to salmon. Last summer, a logjam at Smallwood Park in Eatonville began to fail.

"This was the jam farthest upstream. It was taking the brunt of the energy from the river," said David Troutt, the tribe's natural resources manager.

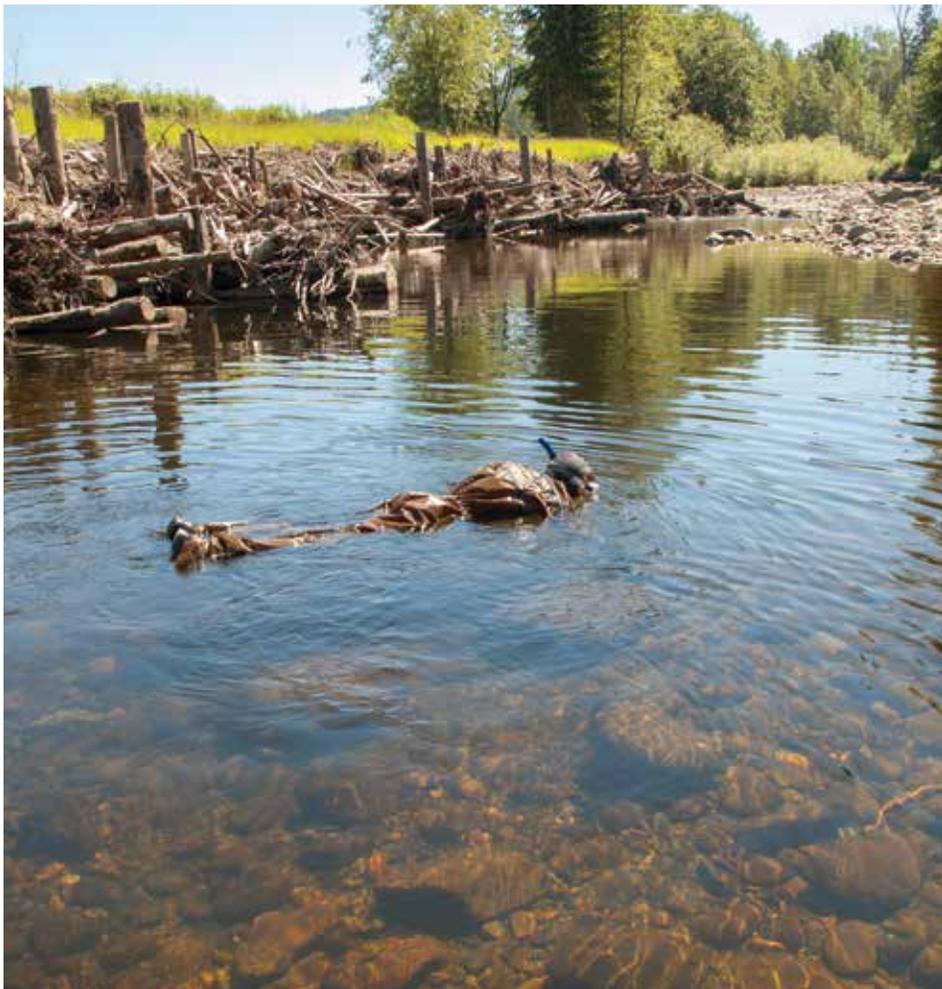
Working with the town of Eatonville, the South Puget Sound Salmon Enhancement Group quickly repaired the jam. It was one of a series built by the tribe and the enhancement group in 2007 to replace a rock bulkhead at Smallwood Park. The logjams at Smallwood are part of 34 jams the tribe and their partners have constructed in the Mashel. Another 10 are planned for next summer.

"We can restore habitat by building logjams, but that doesn't reverse decades of forest management that has removed trees that would have ended up in logjams," Troutt said. "The reason we built the logjam in the first place is also the reason why we need to maintain it."

Since the logjams were built, juvenile salmon have benefited from the new habitat around the jams.

"Our biologists found more than 2,500 coho living in the same part of the Mashel, up from around 900 before the logjams," Troutt said. In addition to coho salmon, the logjams also benefit chinook and steelhead, both of which are listed as threatened under the federal Endangered Species Act.

"Lack of high-quality habitat is the major factor in declining salmon populations in tributaries to the Nisqually River," Troutt said. "This project shows that you can restore and protect habitat while protecting people as well." – E. O'Connell



E. O'Connell

Sayre Hodgson, Nisqually Tribe salmon biologist, surveys the Mashel River in Smallwood Park, where logjams provide vital salmon habitat and help protect the park from floods.



E. O'Connell

Nisqually Tribe natural resources technician Sam Stepetin, left, collects a chinook salmon at the tribe's Clear Creek Hatchery to be released to spawn in the upper Nisqually River.

Increasing Chinook Salmon in Nisqually River

Chinook returning to the Nisqually Tribe's Clear Creek Hatchery were sent upstream to help boost the naturally spawning population.

The tribe transported 2,000 chinook a few miles upstream from the hatchery and released them into the wild. The hope is that the fish will successfully spawn and increase the number of naturally spawned fish leaving this spring.

"We're seeing a sharp decline of natural-origin chinook returning to the river, so we want to make sure these fish are as successful as they can be," said David Troutt, the tribe's natural resources director.

At the same time, the tribe is collecting returning natural-origin fish and spawning them at its hatchery. The goal is to make sure the genetic adaptations of naturally spawning chinook influence the genetics of hatchery fish.

"The genetic difference between natural- and hatchery-origin chinook on the Nisqually is small," Troutt said. All the chinook in the river are descendants from an imported hatchery stock planted decades ago. The native chinook stock was killed off in the 1960s by poor hydroelectric practices that left the river dry for months at a time.

"What we want is for the habitat in the watershed, instead of the hatchery, to drive adaptation of the chinook population," Troutt said. "By integrating the natural- and hatchery-produced fish, we can let the natural stock drive how this imported stock adapts to the Nisqually."

The tribe will be able to track the genetic influence of the transported fish by comparing genetic samples to juvenile salmon caught in a smolt trap next spring.

– E. O'Connell

"We're seeing a sharp decline of natural-origin chinook returning to the river, so we want to make sure these fish are as successful as they can be."

David Troutt
Nisqually Tribe
Natural Resources Director

In-season Management Leads to Coho Fisheries

Despite grim pre-season forecasts for coho throughout western Washington, tribal in-season management led to limited tribal and sport fisheries last fall.

Last spring, tribal and state salmon co-managers predicted dire runs during the pre-season planning process. As a result, early in the process, tribes called for conservative fisheries, especially in mixed-stock areas that opened before true run sizes could be assessed.

“We don’t know how many we’ll see, we don’t know how healthy they’ll be and we don’t know how many eggs they’ll have,” said Lorraine Loomis, chair of the Northwest Indian Fisheries Commission, during negotiations between the tribes and state. “Ocean fisheries depend on good predictions. If the predictions show low returns, we need to constrain fisheries until we really see how many salmon are coming back to each river.”

Terminal fisheries – closer to where salmon spawn in rivers – and other freshwater fisheries depend on real-world data like spawning surveys and hatchery counts.

In many places tribal test fisheries and other activities like the Muckleshoot Tribe’s tally at the Ballard Locks enabled the state to open sport fisheries.

“Without data collected by the tribes, those sport fisheries wouldn’t have been on the water,” Loomis said.

The Nisqually Tribe kept a close count of the coho returning to their Kalama Creek Hatchery and opened a short coho fishery.

“When the predictions look dire, the only rational choice is to close fisheries until you have a good idea of how many fish are going to come back,” said David Troutt, the tribe’s natural resources director.

For the Puyallup Tribe of Indians, the data came too late and they did not fish for coho salmon at all.

“By the time we determined there were enough coho returning to the state’s hatchery on Voights Creek, the majority of the run had passed by where tribal fishermen can fish,” said Chris Phinney, Puyallup harvest management biologist.

However, the tribe was able to open a six-hour chinook fishery in August before closing until chum fishing began in November.

– E. O’Connell



E. O’Connell

Staff at the Nisqually Tribe’s Kalama Creek Hatchery process a coho salmon that has returned to the hatchery.

The Puyallup Tribe made the decision to close its coho fishery this year. To see why, watch a video at nwtt.co/cohoclosure.



E. O’Connell

Devin Case, fisheries technician for the Puyallup Tribe, helps distribute adult coho in the upper Puyallup watershed.

Salmon Spawning Above Glines Canyon

Tribe, state and feds successfully transfer coho upstream in the Elwha River



T. Royal

Lower Elwha Klallam Tribe hatchery technician Ernest “Sonny” Sampson prepares a coho salmon for transfer from the state hatchery to the Elwha River.

“One of the tributaries, Indian Creek, is pretty much self-sustaining now and is a natural coho factory.”

Mike McHenry
Lower Elwha Klallam Tribe
Habitat Program Manager

The Lower Elwha Klallam Tribe is watching five years of work pay off as coho salmon return to the Elwha watershed after the removal of two dams and extensive restoration work.

Since 2011, the tribe, state Department of Fish and Wildlife, Olympic National Park (ONP) and crews from Washington Conservation Corps have transported adult coho salmon into the Elwha River and its tributaries in an effort to accelerate natural recolonization above the formerly impassible Elwha and Glines Canyon dams.

The 635 fish that were transported this year were surplus from the tribe’s House of Salmon Hatchery and state hatchery on the Elwha River. Visible tags were implanted in all the transplanted fish so spawning ground surveyors could identify the origin of coho during surveys. A small percentage of coho were also fitted with radio tags to track migration patterns. Some chum salmon were transferred as well.

“Moving fish upstream has been helping with recolonization during restoration and we’re seeing the results now,” said Mike McHenry, the tribe’s habitat program manager.

“One of the tributaries, Indian Creek, is pretty much self-sustaining now and is a natural coho factory. The creek’s good habitat has led to fish spawning and successfully producing smolts,” he added.

“From our first outplants of adults in 2011, Indian Creek has produced as many as 8,000 to 32,000 coho smolts. That is a rapid and significant response.”

Indian Creek flows between the sites of the old Elwha and Glines Canyon dams, built in the early 20th century with no

fish ladders to enable salmon passage. For more than 100 years, fish were unable to move more than five miles up the river.

Dam removal, which was completed between 2011 and 2014, has opened up an additional 40 miles of mainstem spawning and rearing habitat. It is expected that coho salmon will colonize the majority of that habitat, mostly within the park.

In 2016, relocations have been focused upstream of the old Elwha dam site, including in Madison, Sanders and Griff creeks. Additional releases were made just below Glines Canyon. Subsequent spawning ground surveys have shown both tagged and untagged coho spawning in or near all the release sites. Additionally, park crews have observed coho spawning in Boulder Creek, representing the first documented occurrence of coho salmon spawning above the former Glines Canyon Dam site.

“Due to the challenging survey conditions we typically encounter this time of year, it’s difficult to observe fish spawning, let alone successful fish passage,” said Heidi Hugunin, the park’s Elwha fisheries technician. “Upon seeing both tagged and untagged coho in Boulder Creek this fall, as well as detecting one radio-tagged coho in the former Mills area, we know that these fish have successfully migrated upriver through Glines Canyon.

“Furthermore, the untagged coho have presumably migrated from the mouth of the Elwha River to Boulder Creek on their own volition. The natural recolonization of coho salmon is beginning in the upper watershed.” – T. Royal



Washington Department of Ecology (2)

Left: The old Port Gamble Mill in full operation in 1977. Right: The old mill site after the first season of cleanup in August 2016.

Tribe Sees Port Gamble Bay Finally Cleaned Up

The Port Gamble S'Klallam Tribe has been fighting for nearly 20 years to have Port Gamble Bay cleaned of the pollution and wood waste left behind by an old mill across the bay from the tribe's reservation.

Creosote logs from the mill used to wash ashore onto the tribe's reservation after big storms, affecting the health of the beach where tribal members have been harvesting shellfish for generations, said Jeromy Sullivan, tribal chairman.

Those logs won't be around much longer as the state Department of Ecology (DOE) and the mill's property owner, Olympic Property Group (OPG), are wrapping up a two-year cleanup in January.

Approximately 6,000 creosote pilings and docks, 70,000 cubic yards of contaminated sediment and wood waste, and a derelict vessel are being removed as one of the biggest creosote pile removal projects in Puget Sound.

Fighting for Clean Water

The mill operated for nearly 150 years until it closed in 1995, but marine industrial operations continued until 2014. Mill site soil remediation work was completed followed by dredging in 2007. The main cleanup did not start until 2015 when DOE and OPG implemented a cleanup plan.

But not without the tribe making sure it was done right.

The tribe went to bat for the cleanup, said Paul McCollum, the tribe's natural resources director.

Most tribes in Washington state have to follow state and federal rules to make sure they're doing their own restoration projects properly, he said.

"We were constantly reminding Ecology about the importance in the law and regulations of protecting both human health and the environment," McCollum said. "We elevated the importance of the cleanup to remind them we had folks, who, for multiple generations, have and still rely on these species that live in the bay."

Keeping an Eye on Species Health

The tribe has spent about \$2 million on the effort, including staff time and research to show that the water and sediment were severely polluted. In addition to fighting for the mill cleanup, the tribe cleaned its own beach at Point Julia in 2014, including removing derelict vessels, debris and an old pier.

Tribal scientists have been monitoring the health of the bay before and during the cleanup, by monitoring water quality and eelgrass, and sampling mussel tissue for paralytic and diarrhetic shellfish poisoning.

"We did our own data collecting and tested the samples to show that you can't ignore the data," McCollum said.

"The monitoring is so important to see how shellfish are doing with this transition," said Christine Raczka, the tribe's environmental scientist. "Sampling results tell us immediately how they are being affected. And when the shellfish are poi-

soned, the tribal members can't harvest."

The tribe also was concerned about the bay's herring population because the bay has been considered one of the last pristine habitats in Puget Sound for nearshore fish.

"We did a herring mortality study with the state Department of Fish and Wildlife, who did a great job showing how the pH levels and sediments were connected to embryos that had heart issues," McCollum said. "That helped us with getting attention to remove the thousands of creosote pilings."

Once It's Clean, Keep It Clean

As the project wraps up, the tribe will continue to monitor water quality and shellfish and eelgrass health. The property owner, OPG, will monitor sediment in the bay.

"We need to keep monitoring up, keep the science up to date and make sure we're going in the right direction and not taking a step back," Sullivan said.

While the tribe was not involved directly with the cleanup, it was still vital that the tribe paid attention, for both the tribe and the surrounding community.

"All our families are eating clams or crab or oysters off these beaches, and finfish of many kinds, including bottomfish," Sullivan said. "It's a good step forward toward having clean seafood on our kitchen tables. And it's something we're doing for the future – not just for the bay, but for Hood Canal and Puget Sound." – T. Royal

NORTH SOUND



Life Cycle of Cedar

Left: Chance Poasa, a Lummi Nation School senior, plants a tree during a field trip to a Whatcom Land Trust restoration site along Maple Creek. The site was leveled years ago to create a Christmas tree farm. The land trust acquired the property and has been working with Lummi since 2002 to make it more fish and wildlife friendly.

Below: Trevor Delgado, a Nooksack tribal member, helps sand one of two racing canoes carved for the Upper Skagit Indian Tribe by Nooksack Master Carver George Swanaset Sr. The canoes were carved from a cedar tree struck by lightning near Baker Lake and donated by the U.S. Forest Service to Upper Skagit in 2014.



K. Neumeyer (2)