



*A publication of the Northwest Indian Fisheries Commission*

# Northwest Treaty Tribes

*Protecting Natural Resources for Everyone*

Fall 2016

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# State Should Drop Culvert Appeal



by Lorraine Loomis  
NWIFC Chair

We are disappointed to learn that the state of Washington will continue its longstanding efforts to deny tribal treaty-reserved fishing rights by once again appealing a federal court ruling requiring the repair of hundreds of fish-blocking culverts under state roads.

The state is appealing a unanimous decision handed down in June by a three-judge panel of the 9th Circuit Court of Appeals. That ruling upheld Judge Ricardo Martinez's 2007 decision that our treaty-reserved right to harvest salmon also includes the right to have those salmon protected so they are available for harvest.

Because the state is unlikely to fare any better in this next appeal, we think Gov. Jay Inslee should encourage State Attorney General Bob Ferguson to drop it. The money, time and effort spent denying tribes their rights could be far better spent on salmon recovery. More salmon would mean more fishing, more jobs and healthier economies for everyone, not just the tribes.

The Appeals Court ruling was not surprising. Our treaty rights have been consistently upheld by federal courts – including the U.S. Supreme Court – since the 1974 decision by Judge George Boldt in *U.S. v. Washington*. That ruling affirmed tribal treaty rights and recognized the tribes as co-managers of the salmon resource. The U.S. government filed the culvert case on behalf of the tribes in 2001 as a sub-proceeding of *U.S. v. Washington*.

More than 800 state culverts block salmon access to more than 1,000 miles of good habitat and harm salmon at every stage of their life cycle. The state has been fixing them so slowly it would need more than 100 years to finish the job. In 2013, Martinez gave the state 17 years to reopen 90 percent of the habitat blocked by its culverts in western Washington.

“Washington has a remarkably one-sided view of the treaties,” Appellate Court Judge William Fletcher wrote. “Washington characterizes the treaties’ principal pur-

pose as opening up the region for settlement. Opening up the Northwest for white settlement was indeed a purpose of the United States. But it was most certainly not the principal purpose of the Indians. Their principal purpose was to secure a means of supporting themselves once the treaties took effect.”

The court is right. Through the treaties we gave up nearly all of the land that is western Washington today, but to ensure our survival as a people we kept our rights to fish, hunt and gather in all of our traditional places. Our treaties are legally binding contracts and considered the “supreme law of the land” under the U.S. Constitution. They are as valid today as when they were signed in 1854-55.

The state has made its disregard of the treaties shockingly clear, going so far as to tell the appeals court that the treaties would not prevent the state from blocking every salmon stream in western Washington. The state says it would never do that, yet we continue to lose salmon habitat faster than it can be restored. Salmon populations continue to decline as a result, and we have multiple listings of western Washington salmon stocks under the Endangered Species Act.

The state has a duty to protect and restore habitat for the salmon, treaty tribes and everyone else who lives here. Denying that responsibility, and the treaty rights it represents, hurts tribal and state efforts to work together for salmon recovery. We ask Gov. Inslee and Attorney General Ferguson to take a stand in the best interests of all citizens in the state and end the long, misguided attempts to deny our treaty rights.



**Northwest Treaty Tribes**

*Protecting Natural Resources For Everyone*

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**On the cover:**

A tribal member greets canoes arriving in Nisqually at the end of the 2016 Tribal Canoe Journey.  
Photo: D. Preston, Nisqually Tribe



K. Neumeyer

On the Lummi reef-net boat *Spirit of Sxwo'le*, Lucas Kinley, left, watches for sockeye while his brother Kyle, center, operates a drone-mounted camera, and Steve Solomon pulls the net. See related photo about reef-net culture on page 15.

## ***Holding onto Tradition by Moving into the Future***

An aluminum apparatus anchored off Cherry Point signals an effort to bring traditional tribal reef-net fishing into the modern era.

Lummi fisherman Larry Kinley built the reef-net boat with Pat Pitsch of Strongback Metal Boats using technology shared by the fishing cooperative Lummi Island Wild. Historically, a reef net, or *sxwo'le*, was strewn between two canoes, with tribal fishermen looking down from a perch above. When fish mistook the net for a reef and swam into it, the fishermen lifted the *sxwo'le*.

Kinley's reef-net boat, *Spirit of Sxwo'le*, is higher tech. The net, which resembles the sea floor, is spread between two aluminum pontoons. His two sons work one pontoon, with Lucas sitting atop a ladder watching for fish, while Kyle mans the sidelines and documents the fishery using a drone-mounted camera. Four underwater cameras attached to the net transmit to a monitor in a shed on the other pontoon, where his wife, Ellie Kinley, watches for fins swimming across the screen.

Ellie didn't have too much opportunity to yell for the crew to lift the net during the August sockeye fishery, because there were very few fish to catch. The family viewed the inaugural effort as practice for future fisheries, when they hope to bring tribal youth on board.

"We're looking toward next year," Larry said. "Nobody's fished this area for a long time; we don't have a gauge for how many fish come through here."

A few years ago, Lummi fisherman Troy Olsen said something similar while showing tribal youth how to use a reef net from a canoe.

"Our journey back to the *sxwo'le*, our reef net, is in its infancy and we're just now starting," he said. "We'll go through several years of trials before we can really get back to the salmon path."

The reef-net technology results in a higher quality fish, which can help fishermen support themselves when returns are few, Larry said. The fish go from the net directly into a live bin before they are bled and put onto ice.

"There's minimal handling, so we can sell the fish for more," he said. "We can survive on less."

The Cherry Point location of *Spirit of Sxwo'le's* debut is significant because it is the site of *Xwe'chie'Xen*, a Lummi tribal village and traditional reef net site for hundreds of years. Pacific International Terminals had planned to build the largest coal terminal in the country there, until the U.S. Army Corps of Engineers denied the permit in May at the request of the tribe.

Area tribes and environmental groups opposed the deep-water terminal because it would have destroyed the fishing resource, degraded habitat, increased train traffic and coal dust pollution, and brought with it the possibility of spills and derailment.

A statement announcing the Corps' decision explained that because of the federal government's trust responsibility, the "Corps may not permit a project that abrogates treaty rights." – K. Neumeyer

# Treaty of Medicine Creek Tribes Gather for Historic Meeting



D. Preston, Nisqually Tribe

Canoes pull ashore at the Billy Frank Jr. Nisqually National Wildlife Refuge, waiting to ask permission to come ashore and celebrate the historic gathering of the Treaty of Medicine Creek tribes.

Four tribal canoes arrived at the Nisqually River delta in July, marking the first time the Nisqually, Squaxin Island, Puyallup and Muckleshoot tribes have gathered there since the signing of the 1854 Medicine Creek Treaty.

The Nisqually Tribe hosted the gathering at the newly renamed Billy Frank Jr. Nisqually National Wildlife Refuge, about a quarter mile from the site of the signing.

After the canoes paddled in and asked to come ashore, a representative from each tribe spoke about the importance of learning the history and the sacrifices of previous generations. They also expressed gratitude for the youth participating in the ceremony.

The passage of the Billy Frank Jr. Tell Your Story Act in Congress provided for the renaming of the Nisqually National Wildlife Refuge. It is the only federal site named after a tribal member. The act also created the Medicine Creek Treaty National Memorial at the site of the Treaty Tree. This site will not be public, but will be explained in an interpretive sign off Interstate 5.

The act's name comes from Billy's words in response to those who asked how to bring attention to tribal treaty rights.

"Tell your story," he said. "Keep telling your story." – D. Preston, Nisqually Tribe

## Protocol



D. Preston, Nisqually Tribe (2)

Above: Nisqually dancer Crystal Edwards participates in protocol during the 2016 Tribal Canoe Journey, hosted by the Nisqually Indian Tribe. Right: Don McCloud Jr. bakes salmon for the attendees.



# Tribe Tracks Habitat Access for Steelhead

The Nisqually Indian Tribe is working with the South Puget Sound Salmon Enhancement Group to assess how well steelhead pass through culverts in the Nisqually watershed.

“We can protect and restore habitat throughout the watershed, but just one impassable culvert means steelhead won’t be able to get to that habitat,” said David Troutt, the tribe’s natural resources director.

Biologists from the tribe and the enhancement group are crisscrossing the watershed, hunting down small and sometimes hard-to-find culverts. They take precise measurements to determine whether adult or juvenile steelhead would be able to traverse the culvert.

“Even if the culvert looks fairly innocuous, small things like slope or just not enough rocks in the culvert stop steelhead from making it through,” Troutt said.

How culverts at road crossings can hurt salmon is already well documented in the Nisqually because of efforts to restore Puget Sound chinook salmon, which were listed under the federal Endangered Species Act (ESA) in 1999. Led by the tribe, the Nisqually community was the first to produce a chinook recovery plan and has been aggressively restoring habitat since then.

“Chinook and steelhead use different streams,” Troutt said. “Steelhead are more likely to use a smaller stream to spawn in, for example.”

Nisqually steelhead were part of the Puget Sound population listed under the ESA in 2007. The culvert assessment is associated with a steelhead recovery plan being developed by the tribe.

Steelhead plummeted in the Nisqually River almost 20 years ago. Tribal and state co-managers would like more than 2,000 steelhead to return to spawn every year to the Nisqually, but since 1993, the average return has been fewer than 600. Decades ago, the Nisqually River had one of the strongest runs of steelhead in Puget Sound; more than 6,000 would return every year.

The Nisqually also is one of two watersheds funded by the Puget Sound Partnership to begin writing locally based steelhead management plans. Like the Puget Sound Chinook Recovery Plan, these local plans would provide the basis for the National Oceanic and Atmospheric Administration’s regional plan.

“Documenting, and we hope fixing, these culverts, can mean a lot more habitat available for steelhead here,” Troutt said.

– E. O’Connell

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“We can protect and restore habitat throughout the watershed, but just one impassable culvert means steelhead won’t be able to get to that habitat.”

– David Troutt,  
Nisqually Tribe natural resources director



E. O’Connell

Walker Duval, biologist for the Nisqually Tribe, measures a culvert in rural Pierce County.



T. Royal (2)



Crews use logs with rootwads to make engineered logjams on a 1-mile stretch of the South Fork Skokomish River. This is the second phase of a multiphase project to restore salmon habitat in the river.

## Intensive Use of Logs, Rootwads Help Salmon

Something as simple as a pile of logs and loads of dirt can change the dynamics of a river to benefit salmon.

Deep in the Skokomish watershed this summer, 1,100 trees were used to build 16 logjams in the South Fork Skokomish River. These strategically constructed piles of logs will restore salmon habitat in a 1-mile stretch of the river that was damaged by logging decades ago.

Tacoma Power purchased and logged this swath of land in the late 1950s to build a dam and reservoir, only to discover that an earthquake fault went straight through the property. The project was abandoned but logging had already taken place.

“River functions in the Pacific Northwest are controlled by wood,” said Rich Geiger, the Mason Conservation District’s engineer. “When an area adjacent to a river is logged, it changes the dynamics of the river.”

As a result, the Skokomish Tribe has seen the river channel shift or widen and become shallow because of degraded conditions. Woody debris and native vegetation keep riverbanks stable, and control sediment

movement throughout the river, which plays a part in developing safe places for salmon to feed, hide from predators, and spawn.

“Even though this site is approximately 11 miles from the mouth of the South Fork, what happens upstream impacts everything downstream,” said Alex Gouley, the tribe’s habitat manager. “Similar work done nearby in 2010 had an immediate effect on the river’s form and function, such as creating deeper pools, gravel bar deposition, and narrowing of the channel.”

Immediately following the 2010 work, steelhead were seen spawning around the logjams. After the first big rainstorm, 43,000 cubic yards of sediment settled and stabilized the jams while creating gravel bars and side channels.

“Over time, this restored channel reach with improving watershed conditions will positively influence the timing, duration and magnitude of river flows and sediment movement downstream in the valley,” Gouley said.

The current work is Phase 2 of a multiphase effort to restore a 12-mile stretch of the river. – T. Royal

“River functions in the Pacific Northwest are controlled by wood. When an area adjacent to a river is logged, it changes the dynamics of the river.”

– Rich Geiger,  
Mason Conservation District engineer

# Decades in Making, River Canoe Launches in Nisqually River

For the first time in decades, a traditional river canoe was launched on the Nisqually River.

Reuben Wells Sr. launched the 21-foot-long canoe after a blessing in front of dozens of onlookers. The launch capped 20 years of work on the canoe.

“This boat moves really easy, you just push it along the water and it really moves,” said Wells, chairman of the Nisqually Fish Commission.

“I started working on it 20 years ago, and worked on it a little here and a little there,” Wells said. The unfinished canoe bounced around from place to place until it found a home at the tribe’s Clear Creek Hatchery, where Wells’ son Reuben Jr. works.

“I had it pretty much dug out, but there was a little bit of planing and sanding left to do, then we put a new end piece on it,” he said.

It is the fourth canoe Wells has made and the only one of three handmade canoes on the Nisqually River available for use. One belonged to Billy Frank Jr. and is on display at the Wa-He-Lut Indian School. The other is an older canoe stored at the tribe’s cultural center.

“The first canoe I carved, I made mistakes on. It was really tip-  
py,” Wells said. “I used it for four years but lost it in high water.”

River, or shovel-nosed, canoes differ from open water or ocean canoes because of their shorter length and flat bottoms. Carved from cedar, they effectively navigate shallow stretches of Puget Sound rivers and are easy to control.

The boats are light and buoyant enough for a single fisherman to steer with a long pole in one hand, while playing out a drift net with the other.

“Once you got to the end of drift, you would lay the pole down



*E. O’Connell*

Nisqually tribal members Nugie Kautz, left, and Reuben Wells Sr. inspect a river canoe that Wells and his son recently completed.

and just pull the net in,” Wells said. “But when you laid the net out, you needed to pole with the other hand. It was pretty easy, once you figured it out.”

Wells’ father used to pole a river canoe 10 miles upstream during the day and then drift down the river fishing at night.

“They’d haul 100 fish in one of those,” he said. “It was really something else.” – *E. O’Connell*

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## Digging Deep



Left: Suquamish tribal members Kyle and Kevin George harvest clams near Erlands Point. The Suquamish Tribe held an elders clam dig in August, involving both elders and youth who dig for elders unable to participate.

Below: Jamestown S’Klallam tribal members participate in a shellfish harvest on their tidelands in Sequim Bay.

*T. Royal (2)*



# Tribes Release 2016 State of Our Watersheds

Despite the economy in western Washington slowing to a crawl during the recent recession, the destruction of salmon habitat has continued.

The destruction has been documented by the State of Our Watersheds Report released by the treaty tribes in western Washington in June. The report compiled data covering 22 watersheds in western Washington, tracking indicators that are directly tied to salmon productivity.

“The snapshot we cover in this report covers the years around the beginning of the great recession and

the years the economy started to improve,” said Lorraine Loomis, chair of the Northwest Indian Fisheries Commission. “You might think we’d see an improvement in some numbers, but all we see is a steady decline in salmon habitat.”

In addition to regional reports about Puget Sound and the Olympic coast, the report is divided into tribal areas of interest. This is the third edition of the report, which is available in its entirety at [geo.nwifc.org/sow](http://geo.nwifc.org/sow).

The following are examples of some of the findings.



T. Royal

Lower Elwha Klallam Vice Chair Russ Hepfer walks through the restored Morse Creek project site in 2011.

## Development

Development, stream channelization, diking and armoring are all factors that degrade salmon habitat.

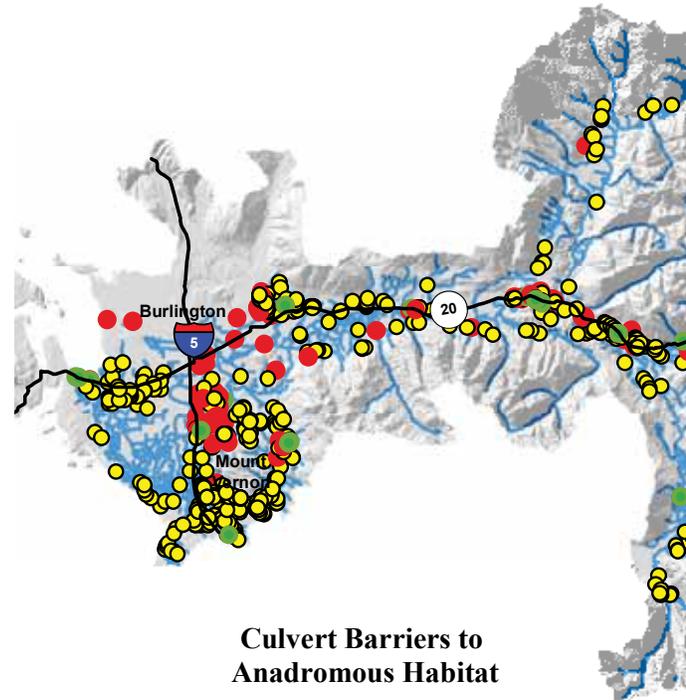
In the Lower Elwha Klallam Tribe’s region, the current condition of Morse Creek prevents salmon, steelhead and cutthroat trout from accessing important habitat for spawning.

Historically the creek was a meandering channel, allowing for slowly flowing water, proper spawning gravel and pools of water that salmon need for resting and feeding. Today, due to nearby development,

the stream has been straightened, resulting in higher flows that scour the channel of the spawning gravel, plus fewer resting pools for salmon. The estuary at the mouth of the creek also has been largely eliminated.

Several restoration projects have taken place, including reconnecting a section of the creek to its historic channel and adding 1,300 feet of habitat, after which salmon were seen using the restored area. However, the area is still in danger of development and further damage.

## Skagit Watershed



### Culvert Barriers to Anadromous Habitat

- Added
- Repaired
- Not Repaired



0 10 Miles

## Barriers

State-owned culverts are not the only barriers preventing fish from accessing spawning and rearing habitat.

Between 2010 and 2014, 107 additional barrier culverts were identified in the Skagit River watershed. Most of these are privately owned, but many are city- and county-owned. Two of them are state-owned.

During the same survey period, only 24 barrier culverts were repaired.

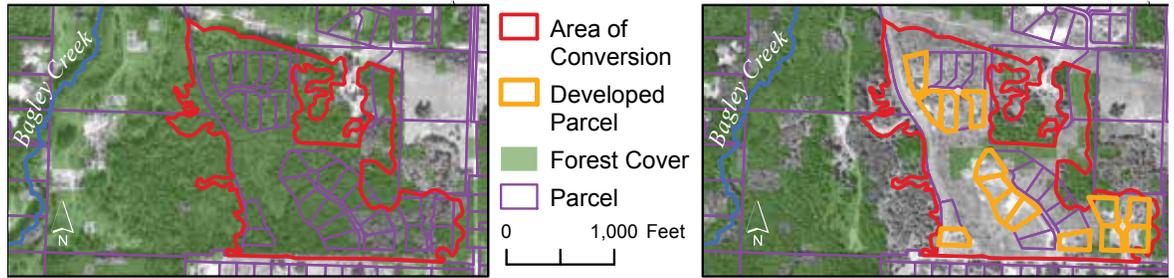
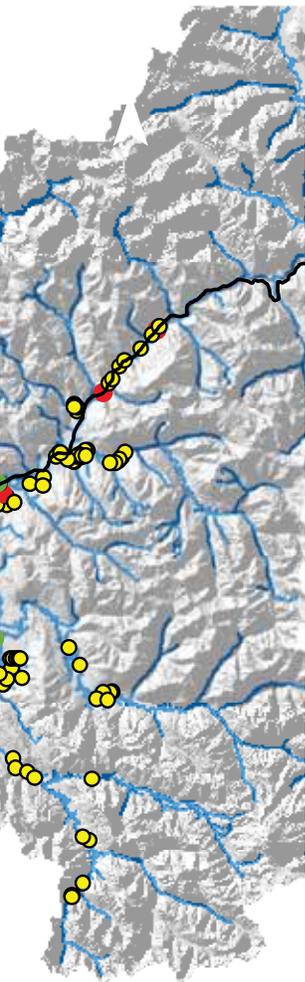
This net gain of 83 barrier culverts shows that the problem is not being solved.

In addition to culverts, flood control facilities prevent salmon from accessing spawning and rearing habitat in the Snohomish watershed.

Facilities at the French Creek and French Creek responsible for the recent loss of chinook production capacity.

Removing the would open access and upwards of side-channel and as potential access for anadromous land watershed. Restored accompanied restoration of anadromous fish access to acres of floodplains.

# Watersheds Report



**Land Conversions Result in Loss of Working Forests:** Seventy acres of forested land cover were removed by two permitted Forest Practices Application activities between 1999 and 2007 at this site near Bagley Creek. Fourteen new homes were built on the converted land between 2007 and 2014, with room for 14 additional homes.

## Forest Conversion

When land is converted out of forest use, important salmon habitat is lost.

From 1999 to 2007, 70 acres of forested land cover was removed near Bagley Creek in the Dungeness-Morse watershed to make way for 28 new homes.

From 2006-2011, the number of sub-watersheds having moderate, poor or severely damaged forest cover increased from 50 to 53 in the Jamestown S’Klallam Tribe’s area of concern.

Some forest cover is regained through vegetation planting, but cover is being lost faster than planted as more forests are converted and developed.

Forest cover is important to healthy stream ecosystems, which support salmon habitat. The quality

of both the stream ecosystems and habitat decreases with loss of forest cover.

Washington state has a Designated Forest Land Program designed to encourage forestland owners not to convert their land out of forest practices.

In the Stillaguamish watershed, 64 percent of private forestland owners have signed up for the program. The remaining private forestland is at a high risk of permanent conversion into residential land use.

This is significant because, as the State of Our Watersheds Report documents, nearly 1,882 acres of forestland has been converted in the Stillaguamish watershed since 1997.

## Low Flows

The State of Our Watersheds reports that more than a half-century of data from the Hoh River gauge at Highway 101 shows that the river’s streamflow is changing, with increased winter streamflows and decreasing summer low flows.

These trends have been predicted to occur because of climate change, while also indicating that salmon habitat and other aquatic ecosystem functions are not being adequately protected.

In the winter, high flows can scour eggs out of gravel and create problems for emerging fry.

In the summertime, decreasing flows and high water temperatures make the habitat less suitable for fish trying to get upstream to spawn. Salmon need both clean and cool water to survive. In August 2015, base flow measurements were at record lows for all seven tributary streams monitored since 2007 by the Hoh Tribe.

If the low flow trend continues, salmon runs may face a significant challenge. A recent study found that chinook salmon populations could be vulnerable to the drastic streamflow changes if spawning fish show up when rivers are at their lowest levels.



D. Preston  
Coho fry are rescued from small pools near the Hoh River.

the mouths of the Marshland  
ek watersheds are primarily  
the approximately 95 per-  
brook rearing and coho smolt  
capacity.  
e French Creek pump station  
ess to at least 50 miles  
115 miles of floodplain  
d tributary habitat, as well  
ess to floodplain wetlands  
s fish. Removing the Marsh-  
pump station with accom-  
ion could provide anadro-  
s to between 400 and 500  
ain wetland habitat.



*E. O'Connell*

Scott Steltzner, biologist for the Squaxin Island Tribe, examines a new fish-friendly culvert on a tributary to Goldsborough Creek.

# Large-Scale Restoration Opens Habitat for Coho

A combination of dam removal and aggressive habitat restoration has led to record runs of juvenile coho salmon in Goldsborough Creek. Last year the Squaxin Island Tribe counted more than 100,000 outgoing coho.

“The increasing runs of coho leaving Goldsborough is in direct contrast to what we’re seeing region-wide, where coho numbers continue a gradual but steady decline,” said Scott Steltzner, salmon biologist for the tribe. “After the dam came down, salmon were able to access the upper 25 miles of the Goldsborough Creek watershed.”

The tribe, the South Puget Sound Salmon Enhancement Group and Mason County are nearly finished with a watershed-wide project to replace three undersized culverts and restore salmon access to almost 4 acres of wetlands and 1 mile of

spawning habitat.

“We’ll see the benefit of the wetland project most likely during the winter when juvenile coho need a calm, safe place to be during floods,” Steltzner said.

In addition, the partners also removed two culverts on nearby Likes Creek, opening more than 1 mile of valuable salmon habitat.

Another project included a logjam and log wall to protect a railroad easement and provide vital habitat for salmon.

“When we removed the Goldsborough dam, we knew our work wasn’t done,” said Andy Whitener, the tribe’s natural resources director. “We took a long-term view, that to really turn around coho populations on Goldsborough, we had a lot of work ahead of us.” – *E. O’Connell*

## LIDAR Map, Tidal Model to Estimate Sea Level Rise

The Squaxin Island Tribe is using Light Detection And Ranging (LIDAR) technology to predict how sea level rise will impact treaty-protected fishing rights.

A hired contractor flew over Squaxin Island to measure elevations.

“You can measure different sorts of vegetation from trees to shrubs, and what the ground elevation is down to the inch,” said Brian McTeague, quantitative services manager for the tribe.

The elevation data will help the tribe estimate the impacts of climate change on the forage fish that salmon feed on, and shellfish.

The tribe also is developing a tidal flow model to predict sea level rise. Currently, tidal predictions for southern Puget Sound are predicted using data collected by a gauge operated by the National Oceanic and Atmospheric Administration (NOAA) in Tacoma.

The tribe recently installed one of the few tidal gauges south of Tacoma, at the mouth of Hammersley Inlet.

“If you want to detect a future change in sea level, you have to know precisely what sea level is right now,” said Erica



*E. O'Connell*

Erica Marbet, hydrologist for the Squaxin Island Tribe, takes measurements from a tidal gauge at the mouth of Hammersley Inlet.

Marbet, the tribe’s hydrologist.

The tribe hopes that NOAA will use the data they’re collecting to update the official tidal prediction model for the area.

“If we want to track climate change, the only thing that matters is the data we collect here,” said Candace Penn,

the tribe’s climate change specialist.

“Even if we’re off by a little bit, in the grand scheme of things that could mean there’s sea level rise so extreme that Squaxin Island is eventually split into two islands.” – *E. O’Connell*



K. Neumeyer

Swinomish water resources technician Jason Thompson tests water quality at Snee-Oosh Beach. The tribe is monitoring three reservation beaches regularly to create a predictive water quality model.

## ***Tribes Sample Water to Ensure Beach Safety***

A couple of North Sound treaty tribes are sampling water quality at popular reservation beaches to make sure they're safe for people to use.

The Tulalip Tribes partnered with Washington State University Beach Watchers to sample Mission Beach and found bacteria levels to be below the threshold for swimming.

"Since this is our first year, we can't draw any patterns yet from the data," said Valerie Streeter, Tulalip's water resources planner. "Bacteria levels vary quite a bit in water. Samples taken minutes apart at the same location can have different levels of bacteria. Over a period of years, patterns will emerge that can be used to shed light on seasonal differences versus potential

bacteria sources."

On the Swinomish Reservation, sampling at beaches near the fishing docks, Snee-Oosh Road and Lone Tree Point also found bacteria levels low enough to be safe.

Swinomish's Department of Environmental Protection has begun a long-term sampling effort at the three beaches with plans to develop a predictive model. Water resources technician Jason Thompson sampled the beaches five times a month throughout the summer and will continue to monitor water quality once a month in the off season.

The water samples are tested for *Enterococci*, a group of bacteria that may indicate the presence of fecal coliform and viruses

that can cause gastrointestinal illness.

In addition to testing water samples for bacteria, Thompson measured depth, salinity, dissolved oxygen and wave height.

"Bacteria can be harbored in sand," he said. "Wave energy can stir it up by moving the sediment."

He also documented the number of people using the beach to see how increased activity affects water quality.

After a year of data has been collected, the department can develop a model. Following another year of verifying the model's predictions, the tribe will be able to issue health advisories should bacteria levels make it unsafe for people to swim or play at the beach. – K. Neumeyer

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"Bacteria can be harbored in sand. Wave energy can stir it up by moving the sediment."

– Jason Thompson, Swinomish water resources technician



T. Royal (2)

Left: Beavers around the Suquamish Tribe's reservation have increased water levels and improved water quality by building dams. Above: Suquamish water resources program manager John O'Leary takes note of the water level in the Keokuk wetlands. He regularly monitors the amount of water the wetlands retain and drain over the course of the year.

## Beaver Activity Improves Drinking Water at Source

The Suquamish Tribe has noticed that water levels in the wetlands around the Port Madison Reservation have been steadily increasing.

"Beavers have moved into one of the reservation's biggest wetlands the past few years, building dams and ponds, creating natural reservoirs," said John O'Leary, the tribe's water resources program manager. "There's about 25 acres of open water now."

For the past 20 years, the tribe has been monitoring water quality and water levels in the Keokuk wetlands and Sam Snyder Creek headwaters, which contribute to the local aquifer. This groundwater is the primary source of drinking water for the Suquamish tribal community.

O'Leary discovered the beaver dams in

2012 when he noticed water levels rising and sustaining a higher-than-normal level.

"Hydrologically, it appears that the beaver activity is a net positive for the health of the system," O'Leary said.

This was especially important in 2015, when many communities around Puget Sound were facing decreased water supplies.

"While most folks dealt with nearly dry creeks, the upper part of Sam Snyder Creek was flowing throughout the summer for what may have been the first time in several generations," he said. "I think the beaver activity contributed to that."

The dams and resulting ponds reduce peak flows and store water to be released more gradually into the stream. The

ponds also supplement the groundwater system, which supports lowland streams, such as Cowling Creek.

"At a time when we're losing wetlands all over the place to development, it's nice to see some being restored and in a natural way," O'Leary said.

One of the few downsides to the extra water is that it limits access to harvest sites for Labrador tea or marsh tea.

"It hasn't been clear if the extra water will impact the ability to collect leaves, or drown the plants," he said. "But we're monitoring that and talking with elders to make sure they still have access to the wetlands as well as other places."

– T. Royal

# Long-running Program Makes Quick Work of Broodstocking

The Stillaguamish Tribe's hatchery program collected all the adult chinook it needed in three sets over three days in August.

This record broodstocking season is in contrast to last summer, when high temperatures and low flows made it a challenge to collect the returning salmon.

For the enhancement program to be effective, the tribe needs about 60 male and 60 female chinook from the North Fork Stillaguamish River. Sometimes the process takes weeks and involves the entire natural resources department of about two dozen, as well as volunteers.

During a habitat survey in July, biologists discovered chinook under a bridge in a site they hadn't fished in years.

"After upstream logjam installations and natural movement of the river, the channel just upstream of the bridge had split itself into two channels, with flow migrating between them," said tribal biologist Kate Konoski. "Over the years, the channel flow re-established a new deep holding pool, even with some woody debris, which may be the reason for the chinook presence at the site this season."

Konoski and biologist Jason Griffith snorkeled the area to count the adult chinook and determine the best way to collect them. Rather than pass the fish from the net pens in the river up steep rocks to the hatchery tanker truck, fisheries staff devised a pulley system that hoists bags of fish to the bridge.

In one set, they collected nearly 40 fish. With that set and two at another site, they were done.

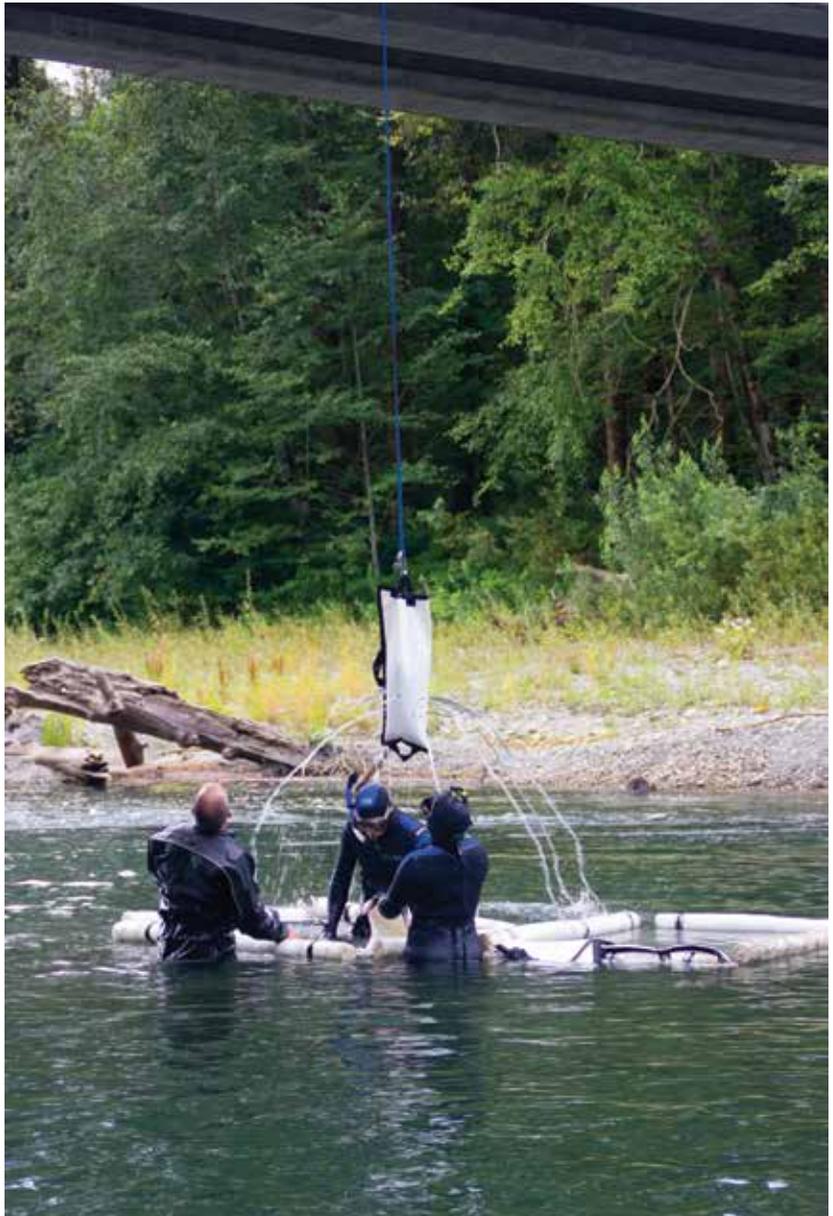
"The tanker truck only holds 50 fish, so it wouldn't have been possible for us to get all the fish we need in fewer than three sets," said fisheries technician Kevin Graybill.

Because of the loss and degradation of salmon habitat, hatcheries are essential tools needed to preserve declining runs. This long-running hatchery program also has provided a comprehensive coded-wire tag data set for more than two decades. – *K. Neumeyer*



*K. Neumeyer (2)*

Above: Stillaguamish biologists Jason Griffith, left, and Kate Konoski prepare to snorkel a section of river to see where chinook are holding. Below: Biologists Jody Brown, from left, Griffith and Konoski attach bags of live chinook salmon to be hoisted to a tanker truck on the bridge above.



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Watch a video of this year's broodstock collection: [nwtt.co/stillybrood](http://nwtt.co/stillybrood)

## FISH HEALTH

# How Contaminated Are Juvenile Salmon?

Northwest treaty tribes want to know how much pollution juvenile chinook salmon are absorbing when leaving their natal streams and estuaries.

Tribes are concerned about possible development issues and other health impacts to juvenile fish that may be caused by exposure to toxic chemicals.

Several tribes have partnered with the state Department of Fish and Wildlife to collect out-migrating juvenile salmon near the mouths of 11 major Puget Sound rivers and the Ballard Locks. All tissue samples will be analyzed by federal, county and international labs for toxic chemicals, such as PCBs and flame retardants (PBDEs). Additionally, a subset of samples will be analyzed for chemicals such as illegal drugs, pharmaceuticals and personal care products that are discharged in wastewater and make their way into rivers and Puget Sound.

A state and federal pilot study in 2013 found that one-third of the juvenile chinook salmon sampled were exposed to contaminants of known concern at concentrations associated with adverse health effects, such as reduced growth and resistance to disease, as well as altered hormone and protein levels.

“Sampling from each major river delta and the Ballard Locks will allow us to assess contaminant exposure at multiple levels, including between major population groups such as the Juan de Fuca and Hood Canal (groups), and between river systems such as the Elwha and Dungeness rivers,” said Mariko Langness, biologist with Washington Department of Fish and Wildlife.



T. Royal (2)

A juvenile chinook salmon is collected for analysis to determine how many contaminants it has absorbed.

“While Dungeness Bay is removed from industrial discharges, we have concerns about stormwater, as well as pharmaceuticals and personal care products entering marine waters from nearby septic

systems,” said Hansi Hals, the Jamestown S’Klallam Tribe’s environmental planning manager.

The Stillaguamish Tribe sampled juvenile chinook in nearshore and estuary habitats, two upriver sites and a smolt trap, said Jennifer Sevigny, a biologist with the tribe.

Stillaguamish also is working with U.S. Geological Survey and the state Department of Health to test adult chinook salmon for contaminants with the goal of creating a risk assessment and safe consumption rate for tribal members.

“We are specifically concerned about persistent bioaccumulative contaminants such as PBDEs, PCBs and chlor-danes,” Sevigny said. “Exposure to these contaminants can affect long-term survival, reproduction success and the genetic health of future generations of salmon.”

Other tribes involved in the study include the Lummi Nation, Upper Skagit, Tullalip, Stillaguamish, Puyallup, Muckleshoot, Nisqually, Skokomish, Port Gamble S’Klallam and Lower Elwha Klallam tribes.

– T. Royal and K. Neumeyer



Mariko Langness, biologist with the state, left, and Neil Harrington, center, and Hansi Hall, scientists with the Jamestown S’Klallam Tribe, pull in a beach seine to sample juvenile chinook from Dungeness Bay.

## Honoring Reef-Net Tradition



K. Neumeyer

Noah Toby of the Lummi Blackhawk Dancers dances at the dedication of a new totem pole, cedar strip canoes and storyboards at English Camp on San Juan Island. Members of the Lummi Nation and the Saanich (WSANEC) Nation dedicated the Coast Salish art in celebration of the 100th anniversary of the National Park Service in August.

The totem pole, carved by Temosen Charles Elliott of the Saanich Nation, depicts a reef-net captain. Lummi House of Tears Master Carver Jewell Praying Wolf James carved the storyboards, and Master Canoe Builder Dean Washington built the cedar strip canoes.

## GENERATIONS

In this 1949 photo, Lummi tribal member August Casimir cooks salmon on wooden sticks called *sl'eng'i*.

Known in the tribal language as *tsine'ilhch*, ironwood or ocean spray is fire-resistant when used to cook salmon over an open fire.

Tribal members passed their *sl'eng'i* down to the next generation.



Lummi Nation Records and Archives

# Makah's Fishermen's Co-op Adds Value, Jobs

The Makah Tribe's Cape Flattery Fishermen's Co-op in Neah Bay is processing its own fish fillets, adding value to the fish and jobs to the community.

Every step of processing done outside of Neah Bay is money that leaves the village.

"The goal of the board of the co-op and the fishermen members was always to get back to processing our own fish," said Joey Lawrence, co-op general manager.

It took several big investments on the part of the co-op, including purchasing a machine that creates "ozonated" water that kills bacteria and keeps it from growing on the fish for seven days.

"It increases the shelf life of the fish, especially since we're not trucking it away from here to undergo this process," Lawrence said.

During the busy seasons, an estimated 25 tribal members are employed to fillet fish before it is vacuum-sealed.

"We have a blast freezer that keeps fish at 33 degrees, but most of this fish is off the water, processed, iced and on a truck to market within a day," Lawrence said.

The co-op's operation has passed the test for federal Food and Drug Administration certification.

Most of the fish being processed is true cod, yellowtail, petrale and Dover sole, but the co-op also packages chinook for



D. Preston

Staff at Makah's Cape Flattery Fishermen's Co-op package fish at the new facility.

specialty markets in Los Angeles, Denver and Boston.

"We couldn't participate in that sort of market in the past," said plant manager Roger Wertenberger.

The co-op also leased a truck that can get into the tight alleys of downtown Seattle and Tacoma.

"Our board and fishermen had this goal

in mind and they took the steps needed to make it happen," Lawrence said.

Future goals include getting machinery to grind up the unused parts of the fish to use in the burgeoning pet food market.

"We're happy with our progress even with the learning curve," Lawrence said. "We want to be known as the freshest fillets on the market." – D. Preston