

"THE SALMON DANCE, ON ITS FIRST ARRIVAL"

Yil-me-lhu

SUMMER 2023



**THE NISQUALLY
WATERSHED
SALMON
RECOVERY
NEWSLETTER**

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Cover Photo: A sandy beach on the McNeil Island Shoreline.

Photo Credit: Christopher Ellings



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Yil-me-hu

**Yil-me-hu, Nisqually word that means
"the salmon dance, on its first arrival."**

The first fish ceremony — The first fish caught in the spring was prepared in an earth pit stove, shared and eaten by members of the village. The bones, left intact, were returned to the river, pointing upstream. This display was symbolic. It meant that the villagers were respectful to the fish spirits and wished that, because the ceremony had been done correctly, many more fish would come up the stream during that year. A dance followed the ceremony called the "yil-me-hu," a Nisqually word that means "the salmon dance, on its first arrival."*

* Carpenter, Cecilia Svinth, Fort Nisqually: A Documented History of Indian and British Interaction. A Tahoma Research Publication. 1986. p13.

Nisqually Indian Tribe



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David Troutt
 Director of Natural Resources
 for Nisqually Indian Tribe

There comes a point in your career that you start to look back at where we started and what we have done together. 35 years at Nisqually is a good time to have those daydreams and they really are great daydreams. We started in earnest our protection and restoration strategies in 1987, coincidentally the year of my arrival in this magical watershed, with about 2% of the mainstem Nisqually protected to over 78%, as we start 2023. We have restored 90% of the estuary and the reality is that I-5 will be reconfigured to increase that number to nearly 100% over time. We have an engaged and active community. We have served as a model for this kind of collaborative work across the region and across the nation. We have made Nisqually “the center of the known universe.”

That is truly amazing. We have moved the Nisqually toward health and ecosystem resiliency and sustainability in a relatively short period of time. There are few places on earth that are in better ecological health now than they were 100 years ago. The Nisqually is at the top of that list, in large part due to the efforts and support of many of you. Rebuilding an ecosystem is a big job and simply cannot be accomplished by one person or one organization. It takes a village to restore a watershed and we have a great village.

All of this work over the past 35 years has positioned the watershed to be more resilient to the seen and predicted future changes to our climate. We are taking into account elevated air and water temperatures, changes to our rain and snow patterns, and flooding impacts on our local communities and economies as we

develop restoration plans. We are truly trying to be as holistic and sustainable as we can without knowing with certainty what the future holds.

There are few places on earth that are in better ecological health now than they were 100 years ago. The Nisqually is at the top of that list, in large part due to the efforts and support of many of you. Rebuilding an ecosystem is a big job and simply cannot be accomplished by one person or one organization. It takes a village to restore a watershed and we have a great village.

Unquestionably there is more work to be done. Lifting I-5 off of the delta has to happen. We need to continue our tributary work on the Mashel and Ohop restoring floodplain connectivity and function. We need to complete and then implement a recovery plan for Muck Creek. We need to solve the sediment issue in the restoring delta by looking creatively at actions in Alder Reservoir. We need to move from 78% mainstem protection to over 90%. We need to fully develop our Community Forest and reach our ownership goal of 30,000 acres.

Perhaps most importantly we need to keep you and your kids, and their kids, connected to this special place. We have seen in the past 100 years how quickly things can unravel and the environment altered. We are planning for future climate issues, but we also need to continue to plan to keep you all informed, engaged, and connected to all we do. You are the “we”.

So let’s take some time this year to pat ourselves and each other on the back for some amazing work completed in the Nisqually. Then, let’s join hands as we move together to continue this good work for future generations. Let’s be sure that this has not all been a daydream, but a vision of the future that we all want to live into. I have another 35 years in me to give to the cause. Join me?!? Mahalo.

Photo Credit: Christopher Ellings

Project Update: Shining the Light on Local Crab Fisheries

Though Dungeness crab is one of the more heavily harvested species in the Salish Sea, managers know relatively little about them and their reproductive success. In 2018, researchers, fisherman, and volunteers across the state formed the Pacific Coast Crab Research Group to coordinate and prioritize research and outreach efforts to address data gaps related to marine crabs. Part of this research has included a Salish Sea-wide project which uses light traps to gather much needed insight as to whether larval abundance can be an early indicator of future adult abundance, the timing and location of these populations, and lastly, whether there are any distinct populations of Dungeness crab in the Salish Sea.

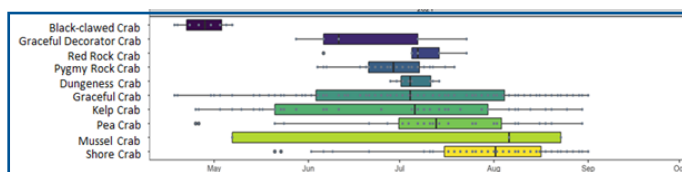
For nearly five years now, the Nisqually Indian Tribe Shellfish Program has partnered with Washington State's Aquatic Reserve Program, the Nisqually Reach Nature Center, and the Pacific Shellfish Institute to collect crab larva data using a light trap set at Zittel's Marina in South Puget Sound. This data, combined with the data collected in nearly 40 other light traps in Washington State and British Columbia, are helping guide management decisions and designing better harvest management tools.

Findings from this research consistently show a low number of larval Dungeness crab at the Zittel's light trap. Though disappointing, the lack of Dungeness crab larva is not surprising. Managers have been seeing limited numbers of adult crab for years in the South Sound, very few of which are females. The low numbers of larva, in conjunction with the low adult

numbers, has led to suspicions of very limited local population growth.

To further investigate the South Sound Dungeness population, researchers are comparing Dungeness crab genetics across Puget Sound populations. Genetic information will be collected from both larval crabs caught at several light traps, including the one at Zittel's Marina, and adult crab collected in commercial and test fisheries. This genetics work will allow researchers to see whether the crab larva collected in the light traps are from the nearby adults, as well as how closely related the larval and adult population in South Sound is to other populations in Puget Sound. The results of this study will help guide how crab fisheries are managed in the South Sound and develop tools that will allow for better adaptive management.

In addition to learning more about Dungeness crab, light traps have also been useful in demonstrating what other crab species are in the area and the timing of their larva. While not a substitute for Dungeness populations, understanding species composition in South Puget Sound can help managers better understand the marine ecosystem and environmental dynamics of the area.



Species and timing of crab megalopa caught at the Zittel's Light trap in 2021. (Modified from figure created by Allison Brownlee, WaDNR Aquatic Reserves Program.)



Photo Credit: Margaret Homerding

Unsorted light trap sample, Summer 2022.

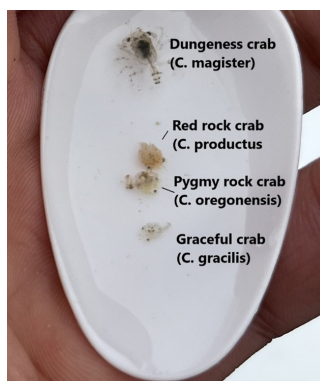


Photo Credit: Margaret Homerding

Spoon holding megalopa of just a few crab species found in the Zittle's Light trap.



Photo Credit: Margaret Homerding

Larval shore crabs caught Summer 2021.

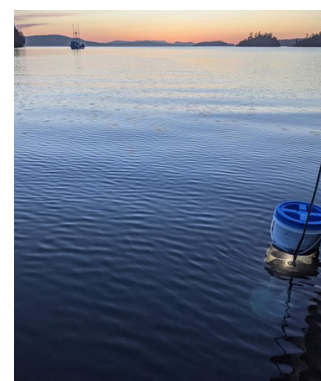


Photo Credit: Emily Buckner

A light trap gets lowered into the South Puget Sound.

USING SONAR TECHNOLOGY TO MONITOR NISQUALLY SALMON

Have you ever looked at the surface of the Nisqually River and wondered about the fish that are swimming around at that very minute? To answer this question, in the summer and fall of 2022, the Nisqually Indian Tribe's Department of Natural Resources began testing a Didson ARIS Imaging Sonar in the fish ladder at the Centralia City Light Diversion Dam. The fish ladder is located at Nisqually River Mile 26, a few miles southeast of the City of Yelm.

The Imaging Sonar uses up to 128 small sonar beams to create a picture of objects, such as fish, present in the water nearby. Much like a movie, the sonar picture is refreshed many times a second, producing visuals, including fish swimming upstream or leaves drifting downstream. Also, because sonar technology uses sound reflected off of objects to create their underwater images, the sonar is able to function even if the water is cloudy from glacier melt or muddy from heavy rainfall. The sonar can also provide measurements of fish and it may even be possible to see differences in swimming behavior, which can help determine what species a fish is likely to be.

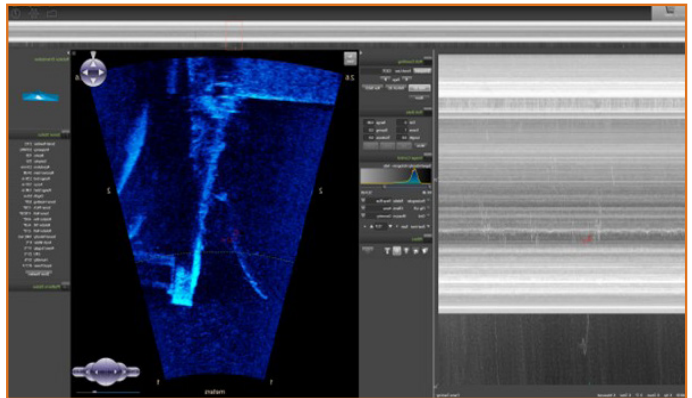
This past year, Tribe staff implemented a pilot year with this new technology, allowing them to learn about how details like mounting locations, debris and sediment management, and fish behavior can affect sonar detections and image quality. As images show, it is possible to get clear images of salmon swimming upstream, even in a confined area like the fish ladder, during high flows and poor visibility. Staff also uses the time of year and size of the fish captured by the sonar for help in identification.

In the coming year, Tribe staff plans to begin testing the sonar further downstream in the Nisqually River in hopes of counting salmon as they enter the river from Puget Sound. Using the sonar in the lower river can help generate better estimates of salmon entering the river, as well as more accurately count seals and sea lions swimming upstream. The imaging sonar will help the Nisqually Indian Tribe better manage Nisqually salmon populations, opening a wide world of exciting freshwater and marine biological research possibilities.



The Didson ARIS Imaging Sonar as it sits in the fish ladder at the Centralia Diversion Dam.

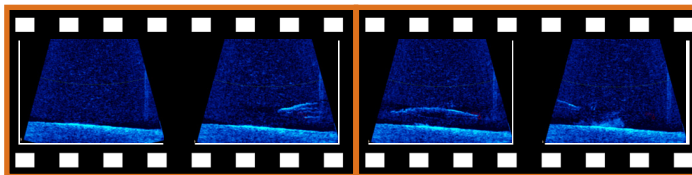
Photo Credit: Jed Moore



A presumed coho salmon, recorded November 2022.



A presumed steelhead trout, recorded June 2022.



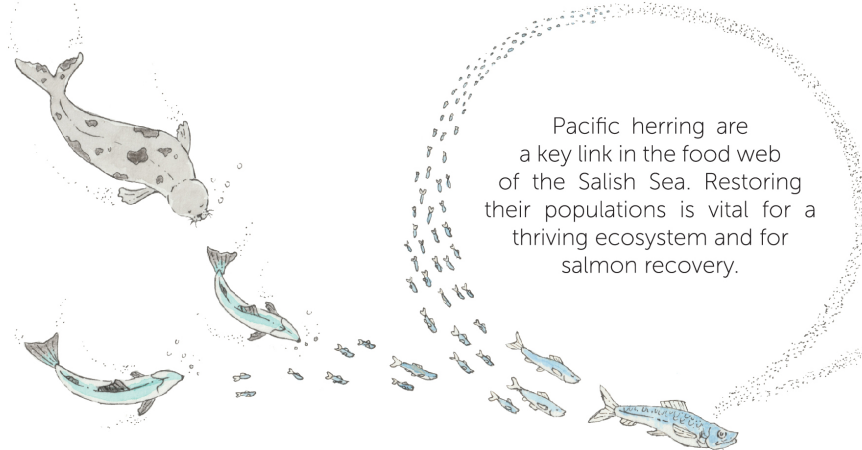
A series of four images of a presumed Chinook swimming by the Imaging Sonar, recorded November 2022.

The Nisqually Reach

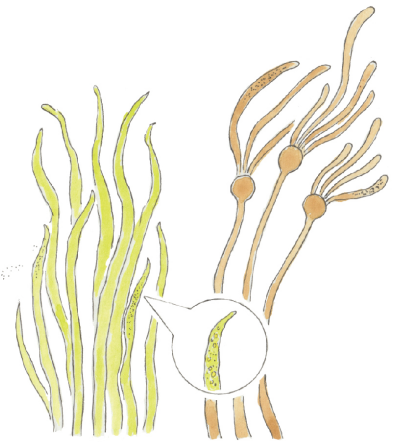
PACIFIC HERRING AND SALMON RECOVERY



FOOD WEB FOUNDATION



CREATURES OF HABITAT



Herring are **forage fish**, a small fish that many other species rely on for food. Birds, seals, and even people eat herring. Young salmon, like Chinook, grow faster and stronger when there are plenty of nutritious herring to eat as they enter the ocean. **Boosting herring populations in Puget Sound is critical to increasing salmon survival.**

Herring, like salmon, are ecologically, culturally, and economically important in the Salish Sea. And like salmon, many populations have experienced dramatic declines. Young salmon depend on plentiful herring populations, meaning that recovery of these species must go hand in hand. Guided by both Indigenous and Western scientific knowledge and methods, we hope to gain insights to aid herring and salmon recovery.

Herring spawn in nearshore areas where their eggs attach to **vegetation**, like eelgrass and kelp. Many eelgrass and kelp beds in Puget Sound have been lost since the 1800s, due to shoreline development, pollution, and warming waters. Throughout history, Indigenous peoples have harvested herring eggs by placing trees, branches, and kelp along shorelines where herring were known to spawn. **Can this technique help scientists learn about herring and how to recover them today?**



Illustrated by Connelli Designs



Photo Credit: Lucas Hall
LLTK staff checks a cedar bough for herring spawn.



Photo Credit: Jack McDermott
NIT staff ventures out to drop trees in the Puget Sound for the Nisqually Herring.



Photo Credit: Jack McDermott
LLTK staff dropping a rake to check to check for herring spawn.

ch Herring Project

Pacific herring are a species of forage fish – small, schooling fish that are often overlooked, but form a crucial link in the marine food web. Herring are an important prey source for marine mammals, birds, and other fish, including juvenile salmon. Research shows that salmon (especially Chinook) have better growth and survival when there are abundant, energy-rich young herring to eat as they enter the ocean. Healthy herring populations are a key to salmon recovery.

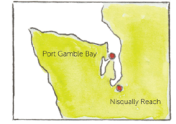
Unfortunately, Salish Sea herring populations are declining, particularly in South Puget Sound. One major factor is the loss of nearshore spawning habitat, as eelgrass and kelp beds where herring lay their eggs have been lost to shoreline development, pollution, and warming waters. Nisqually Indian Tribal elders report that herring used to spawn in the Nisqually Reach, but as South Sound herring have declined in recent decades, there has been little current data available about how herring are using this area.

Starting in 2021, the Nisqually Indian Tribe (Tribe) and Long Live the Kings (LLTK) began looking to traditional ecological knowledge to learn more about the local herring populations and test a possible solution to their habitat problem. Herring and their eggs have been a food source for Pacific Northwest people for thousands of years. The Nisqually, like many West Coast Indigenous people, used a long-standing practice of sinking evergreen boughs in nearshore waters during spawning season to collect herring eggs for harvest. Eggs stick to the tree branches, as they would to eelgrass or other marine plants. Drawing on this traditional technique, the Tribe designed a study using trees to supplement spawning habitat and collect information about the timing and genetic makeup of herring around the Nisqually Estuary.

In January, before herring spawning season begins, the Tribe and LLTK biologists headed out to the Sound to submerge evergreen trees and boughs at several depths in the Nisqually Reach. The evergreens are monitored regularly throughout the spawning season, January to June, to check for

STUDYING HERRING: INDIGENOUS KNOWLEDGE AT WORK

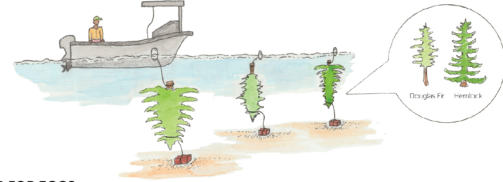
Since time immemorial, Coast Salish and Alaskan Tribes have collected herring eggs for harvest by placing evergreen trees and branches in nearshore waters during spawning season. Eggs stick to the branches as they would to eelgrass or other marine plants. Scientists are adapting this technique to study and recover herring populations in decline from habitat loss, pollution, predation, and climate change. Using supplemental spawning habitat, surveys of underwater plants, and biological study of adult herring, we are learning valuable information about herring and their spawning behavior in an area important to young salmon.



STUDY SITES

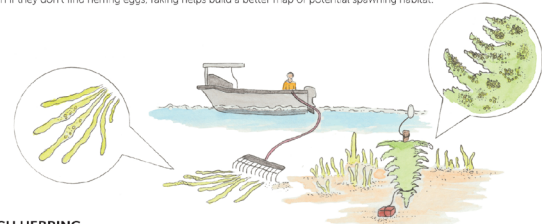
1. SINK TREES

In January, before herring spawning season begins, researchers submerge evergreen trees and boughs near shorelines in Puget Sound. Different depths, types of trees, and environmental conditions may determine whether herring spawn on the branches.



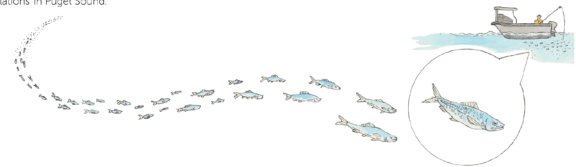
2. MONITOR FOR EGGS

Researchers check regularly for herring spawn on the branches, as well as on the natural marine vegetation (collected by raking along the sea floor). Even if they don't find herring eggs, raking helps build a better map of potential spawning habitat.



3. CATCH HERRING

Researchers check regularly for herring spawn (and their DNA) in the Nisqually Reach to better understand their behavior and how they relate to other herring populations in Puget Sound.



Illustrated by Connelli Designs

herring eggs. As part of the study, staff are also mapping and monitoring eelgrass beds in the area for herring spawn, as well as collecting adult herring for further study. Even though the team has yet to identify herring spawn near Nisqually shorelines in the first two years of the study, they're gaining vital information about the herring population and potential spawning habitat that they hope will provide tools for recovery.

"We're taking an ecosystem-wide lens to salmon recovery by looking at the entire food web, similar to the approach that Tribal people have used to manage these resources throughout history," said LLTK's Ashley Bagley. "Sampling adult herring can give us vital information on their genetic population structure, as well as about toxics and food availability that might be affecting the food web for Nisqually salmon."

RESTORING MCNEIL ISLAND



Photo Credit: Emiliano Perez

The Tribe's Native Plant Restoration Crew at the McNeil Island Gravel Yard restoration site.

Located in the heart of the Puget Sound, McNeil Island is filled with a rich history of inhabitants and activities. Beginning nearly 12,000 years ago, prior to its settlement by Ezra and Oliver Meeker in 1853, the island was believed to be inhabited by Native American Tribes of the Salish Sea. Interests in the island centered around fishing and clamming, both of which still exist today because of the treaty rights assigned by the Medicine Creek Treaty of 1854 and upheld by the Boldt Decision of 1974.

For over 100 years, the McNeil Island Corrections Center ran as a federal penitentiary. This all changed in 1981 when Washington State began leasing the island and the prison, operating as a

state facility until ownership was officially transferred in 1984. Washington's Department of Corrections (DOC) would effectively run the facility for 30 years, before finally closing its doors in 2011 due to the increasingly high costs. Today, the "Alcatraz of the Puget Sound" continues to be the home of a Special Commitment Center, a program of the State's Department of Social and Health Services (DSHS).

With the closure of the main prison facilities, came the opportunity for habitat restoration across the island. In 2015 project partners, including Washington's Department of Fish and Wildlife (WDFW) and Department of Natural Resources (DNR), working in coordination with DOC, completed the McNeil Island Habitat Restoration Project Feasibility Report, determining the full habitat potential of the island. Their findings showed that due to the lack of public access, that apart from the prison's facilities and infrastructure, much of the island still exists in its natural state. This includes nearly 1.3 miles of shoreline that has been proven to be heavily utilized by multiple species of salmon. Research and monitoring completed by the Nisqually Indian Tribe's Department of Natural Resources has indicated that this habitat is especially important to chum salmon, a species incredibly important to Nisqually fishers. Chum have been found in high densities using the McNeil Island nearshore and they, along with ESA-listed Chinook, are critical for supporting the Tribe's invaluable treaty right.

Restoration efforts kicked off in summer 2021 with the Milewa Creek Estuary Restoration Project. Funded by the Puget Sound's Estuary and Salmon Restoration Program (ESRP), this project aimed to reconnect former tidal wetlands with full tidal exchange, benefitting Chinook and other estuarine fish and wildlife. In addition to tidal reconnection, the project removed a failing roadway, a culvert at the mouth of the disconnected estuary, and a concrete groin structure that extended along the beach.

Alongside the restoration, partners completed the Still Harbor Restoration Feasibility Report, a document which outlined a multi-phase effort to recover nearly all the McNeil Island shoreline. This plan, a road map for recovery of McNeil Island and the associated nearshore would allow stakeholders to mark a path forward, utilizing funding as it comes available.



Photo Credit: Christopher Ellings

The Tribe's Salmon Recovery Program aboard the McNeil Island ferry, Summer 2022.

Summer 2022, staff from the Nisqually Indian Tribe's Salmon Recovery Program were invited to the island to see the full suite of potential projects. Staff were able to witness firsthand the amazing opportunities to restore nearshore habitat structure and function across miles of shoreline. It was that day that the Tribe committed to seeing the different phases of restoration implemented, beginning with assisting with planting of native trees and shrubs on the island as part of the Gravel Yard and Baldwin Point Restoration sites.

That following winter, the Tribe's Native Plant Restoration Crew set aboard the McNeil Island ferry, alongside DNR staff, to begin installing just over 4,500 native trees and shrubs across the two sites. Over the course of two weeks, the crews worked together to restore 2.5 acres of riparian habitat. These plantings are merely the beginning of what hopes to be a very valuable partnership between the Tribe, DNR, and WDFW. With many other sites on the island still in need of restoration, stakeholders are determined to bring the island back to pre-settlement conditions.



Photo Credit: Christopher Ellings

Gertrude Island at low tide.

Photo Credit: Christopher Ellings

THE HISTORY OF HYDROELECTRIC

Since the early 20th century, there have been two hydroelectric projects in the Nisqually River watershed. The first is the City of Tacoma's Alder/LaGrande Complex. The project began in 1910 with a simple diversion dam, approximately 40 feet high, located near the town of Alder. This system diverted the flow of the river, up to 900 cubic feet per second (cfs), into a flume and then a tunnel, eventually reaching the turbines at the LaGrande Powerhouse.

At the time, the project did not store water, and therefore did not affect the river's flow, however it was high enough to block fish migration. No state or federal license was attached to this project until 1942, when Tacoma began a major renovation and expansion of its Nisqually facilities. It applied for and received a federal license from the Federal Power Commission (since renamed the Federal Energy Regulatory Commission, or FERC).

Construction of this two-dam project was initiated in 1942 and completed in 1944. Alder Dam, located at RM 44.2, is a storage dam and creates a 7-mile reservoir, known as Alder Reservoir, behind it. Two miles downstream sits the LaGrande Dam. Located in a high and narrow canyon, it diverts the water released from Alder into a large tunnel and, ultimately, through turbines at the now expanded LaGrande Powerhouse. Both Alder and LaGrande have several turbines and when all are operating at full capacity (in mid-winter, for example) the total flow released from the project is about 2,350 cfs.

Following completion in 1944, Tacoma regularly used its Alder/LaGrande Complex to produce what is known as "peaking power." This means they generated more power, and released more water, when the demand was highest. This operation resulted in downstream flows that changed rapidly on a daily basis and resulted in damage to fish habitat and private property. Tribal fishers once described this as a mid-afternoon "wall of water" that

would come downstream each day. This practice would finally cease in 1968.

The second hydroelectric project is the City of Centralia's facility located near Yelm. Constructed in 1930, it consisted of a diversion dam that diverts flow into what is known as the Centralia Canal and ultimately through the project's powerhouse. Initially this hydroelectric project was not subject to any regulation or operating rules, nor did it have a working fish ladder

allowing salmon to pass during summer low flows. The only legal authority for the project was its WA State water right, granted in 1928. This allowed them the ability to divert up to 720 cfs of flow from the Nisqually River, using only half that amount until 1955 when they expanded the facility to utilize their full water right. The increased water usage had an extreme effect on the canal during the low flows of the summer months, effectively dewatering the Nisqually River downstream of the dam. At this time fish screens were installed, keeping numerous juvenile salmon from being swept into the canal and



Photo Credit: Christopher Ellings

A view of Alder Dam from above.

Photo Credit: Amber Left-Hand-Bull

The Centralia Diversion Dam as it exists today.

DEVELOPMENT ON THE NISQUALLY

ultimately killed by turbines, and the fish ladder was updated. In 1989, Centralia would eventually apply for and receive a federal operating license.

In 1974, the Nisqually Indian Tribe filed federal lawsuits against Tacoma and Centralia for damages to salmon runs and to the Tribe's fishery and treaty fishing rights. The case was filed in Tacoma and initially heard by Judge George Boldt, who directed the Tribe file a petition with the Federal Power Commission (FPC) to seek modification of Tacoma's federal operating license. It would be 1978 before an FPC judge would issue an initial decision. He ruled that FPC regulations did not allow for determining past damages, but the FPC could establish minimum stream flow requirements. Tacoma argued that these requirements placed an unfair burden and, to address these objections, the judge established the Nisqually River Coordinating Committee (NRCC), with membership of the Tribe, the Department of Fish and Wildlife, Department of Ecology, and the two utilities, Tacoma and Centralia. The assignment for this group was to conduct various technical studies concerning the adequacy of the interim minimum flows and their impacts on hydroelectric operations.

From 1978 until 1983, the NRCC met regularly to review study designs and study results. The primary studies conducted were to determine what minimum flows would best protect salmon habitat. Study areas were identified above the Centralia diversion dam, in the McKenna bypass, and below the Centralia powerhouse, to determine flows for both spawning protection and summer rearing habitat, for ESA-listed fall Chinook and steelhead. In 1983, the FERC Judge issued his final order, making permanent the minimum flows and other requirements to protect salmon. He also made permanent the NRCC, which continues to meet quarterly to discuss various issues associated with hydroelectric operations, river flows, and other federal licensing issues.

In the U.S. stream flow is measured in cubic feet per second (cfs). This calculation is determined by measuring the wetted stream width and depth (to determine cubic feet) and multiplying this by the rate of flow as measured by a flow meter. Since these numbers will vary over the width of a stream, the calculations are made using multiple sub-units (think of them as boxes) across the stream. The total flow is the sum of these separate sub-units.

A small stream in mid-summer may flow at only a few cfs and many tributaries flow at only 10-20 cfs. In contrast, Nisqually River's total flow is much more. In the summer the Nisqually River flows at about 800 cfs and a typical mid-winter flow is 3000 cfs.

Nationwide, a series of flow measurement stations are maintained by the U.S. Geological Service (USGS), many co-funded by local partners. In the Nisqually River watershed, there are seven USGS gauges. Tacoma Power funds three stations, Centralia City Light two, and the Nisqually Indian Tribe funds the two on tributary streams. The flow stations send an electronic report of stage every 15 minutes, and these data are posted regularly on the USGS website <https://waterdata.usgs.gov/wa/nwis/current/?type=flow>.



Photo Credit: Tacoma Power

The original Tacoma Diversion Dam, 1912.

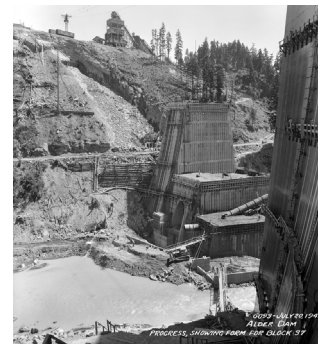


Photo Credit: Tacoma Power

Construction of Alder Dam, 1943.

Lidar-based Change Analysis

IN THE NISQUALLY DELTA

The confluence of the Nisqually River with Puget Sound is known as the Nisqually Delta and is a rich environment teeming with fish and wildlife like the endangered Nisqually Chinook salmon. Similar to every major river delta in Puget Sound, the Nisqually Delta was diked and drained as settlers transformed nurseries for fish and waterfowl to fields for crops and livestock. For over 20 years, the Nisqually Indian Tribe has led an effort to restore the natural functions of the Nisqually Delta by removing dikes and returning the tide to over 900 acres of the Delta. This recovery effort is one of the largest projects in the Pacific Northwest and one of the most significant advances to date towards the recovery of Puget Sound. In order to monitor changes to a landscape as large and diverse as the Nisqually Delta, managers are utilizing advanced technology to detect changes through time.

In the Nisqually River Delta, data collected from satellites and airplanes are being analyzed to provide an assessment of habitat change following tidal wetland restoration. Understanding physical changes to the elevation of the landscape is an important component of monitoring a river Delta. In a Delta, even small changes in elevation can drastically change the habitats within the estuary. Aerial lidar, or “light detection and ranging”, is a remote sensing method that uses laser pulses to produce a model of the topography. This method produces data that is ideal for analyzing changes in elevation on the landscape in part because lidar produces precise, fine resolution data—with an elevation value for every square meter.

Using lidar datasets collected in winter 2011 and 2020, a change analysis is being conducted by quantifying the difference in elevation of each square meter across the delta. The result is a map of net elevation change over the ~10 year period. Depending on

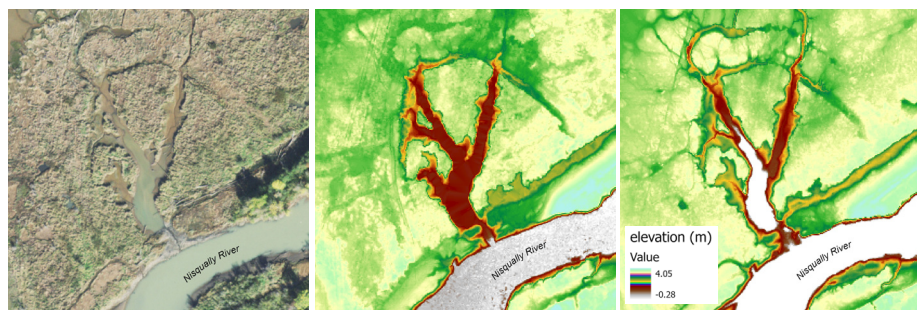


Image Credit: All Eagleview Technology Corporation

High resolution aerial imagery of the Nisqually Delta recorded in 2021.

the magnitude of change, lidar-based change analysis has the potential to reveal geomorphic change—such as new channel formation or changes in channel size or shape. Spatial patterns of elevation gain or loss (or lack thereof) on the landscape will be analyzed in relation to other physical (e.g., sediment accumulation rates) and biological (e.g., vegetation) datasets to further assess habitat change.

The ability to measure physical changes across hundreds of acres of Nisqually Delta is invaluable to the Nisqually Indian Tribe salmon recovery effort. With this information the Tribe can assess the effectiveness of restoration and determine actions to ensure that the Delta continues to recover and provide important functions for fish and wildlife. The change analysis is already helping to identify future restoration needs, like enlarging the Interstate 5 bridge over the Nisqually River in order to increase the Delta’s resilience to sea level rise and flooding. New technologies that enable extremely fine scale measurements across large areas are an exciting advancement in ecosystem monitoring and are proving to be valuable tools for ecosystem protection and restoration.



Aerial and lidar imagery of area encompassing a channel branching off the Nisqually River into the 2009 Refuge Restoration. Far left: 2019 aerial imagery (USDA National Agriculture Imagery Program); 2011 (middle) and 2020 (far right) lidar bare earth Digital Elevation Models (DEMs), representing the elevation of the marsh surface (absent vegetation, water, etc.). A visual comparison indicates changes in the depth and length of channel branches from 2011 to 2020 (note changes in extent of yellow and dark red). Note that in 2020 lidar, white represents area with no data collected due to a difference in data processing method.

CREATING STEWARDS IN THE NISQUALLY



All Photos by Tristan Olson

When we think about salmon conservation work, often what comes to mind are the big projects such as culvert removals, delta restorations, and thousands of planted trees. While all of these are incredible, it's sometimes intimidating to know where to start or how you can get involved. The Nisqually Stream Stewards (NSS) program exists to help make that first step an easy one. Established over 20 years ago, NSS is a joint program between the Nisqually River Council (NRC) and the Nisqually Indian Tribe (NIT) formed with the recognition that long-lasting restoration and protection of salmon habitat will come about only through a community-based effort. The goal of the program is to help interested citizens gain the skills necessary to become stewards/caretakers of the watershed, through networking, hands-on experiences, service opportunities, and a sense of community.

While the pandemic put a pause on programs, the Stream Stewards are back in full force with monthly events and volunteer opportunities. This past year has seen stewards perform beach seines and forage fish surveys at the Nisqually Reach Nature Center, test water quality at the confluence of the Mashel and Nisqually, visit old growth forests with the Mount Rainier Institute, and even plant trees along the river with the Nisqually Land Trust! By taking a class that was once a weekend and expanding it throughout the year the hope is that more people than ever before can get involved and learn about the local environment from experts working in the field every day.

The Nisqually Watershed is a beautiful place with a rich cultural and environmental history that continues into today. It's a place we can all visit and experience its natural beauty because of the work others have been doing for decades to help conserve its waters, forests, and wetlands. While the NSS course consists of nine different events throughout the year to graduate, the end goal extends far beyond a certificate and

salmon crown - although yes, you do get those! Nisqually Stream Stewards are just that - stewards. The days spent exploring and learning about the watershed from where it begins at Mount Rainier to where the Nisqually River empties into the Sound at the Billy Frank Jr. Nisqually National Wildlife Refuge, exists not just to grow your knowledge of the land, but your connection to it as well.

When you join the Nisqually Stream Stewards, you join a whole network of community members eager to get outdoors and get their hands (and boots) a little dirty. There are a million different ways to stay involved in Nisqually and whether you join the NRC, stick with NSS, or continue on through one of our partner organizations, there is a place for you and your passion. This environment has been entrusted to one of the best communities in the world (yes, we're a little biased) and we aim to live up to that trust by managing it responsibly and with care. So, if you want to learn about our forests, look at wild stream bugs, or toss some salmon, let us know!

Learn More & Join: nisquallyriver.org/stream-stewards | streamstewards@nisquallyriver.org

NREP: YEAR IN REVIEW

Connecting students and teachers with service-learning projects that address local environmental issues is what the Nisqually River Education Project (NREP) does. We aim to inspire stewardship of the Nisqually Watershed and the world. The goal is lofty, but equally worthy, and on the ground it means youth are getting their hands dirty and their boots wet.



Photo Credit: Kim Williams

Middle school students participate in fall water quality monitoring throughout the Nisqually Watershed.

When a student gets their boots wet it means they are in the field, immersed in forests, spending time along creeks, or standing along the edge of the river. Each field experience is ripe with science concepts that build upon their classroom learning. Students may be planting a tree, testing water quality, or tossing a salmon carcass to bring vital nutrients to the ecosystem. Though the activities are different they are all connected by a common thread that promotes a sense of place, recognizing the waters that connect us, and taking part in actions that place students in the position to be a part of the solution to the challenges of recovering salmon populations and protecting vital habitat throughout the watershed.



Photo Credit: Tristan Olson

Elementary school students are proud to be helping restore habitat as they plant riparian areas along the Nisqually River.



Photo by: Emily McCartan

Students visit a local creek during a chum salmon viewing field trip.

SINCE SEPTEMBER, OVER 2,000 STUDENTS HAVE TAKEN PART IN NREP FIELD TRIPS:

88

students visited a local fish hatchery to learn about why hatcheries are needed directly from hatchery staff. This trip focused on introducing high school students to careers within fisheries as they explored fish hatchery operations.



429

students participated in water quality monitoring in October and November, testing their local waters for dissolved oxygen, pH, nitrates & turbidity. Students learn about the importance of healthy waters for salmon & other wildlife as well as thriving human communities.



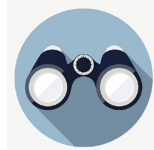
441

students participated in tree planting along the Nisqually River. Our partners at Nisqually Land Trust welcomed students to their Lackamas Flats property to plant native trees, shrubs, and wildflowers. Students had the opportunity to participate in an experimental planting being conducted at the site: Of the 600 Douglas fir trees that were planted, 200 included the addition of mycorrhizal fungi, 200 with compost, and 200 were planted without the addition of anything. Partners look forward to checking back on the site to see which Douglas firs grow best.



953

middle school students from North Thurston Public Schools visited McLane Creek to view chum salmon. Students hiked the trail, learning about plants and wildlife, before arriving at the creek to collect data on chum salmon behavior.



500

students participated in salmon dissections. NREP took chinook salmon, donated from the Nisqually Tribe's Clear Creek Hatchery, into classrooms for this odiferous lesson. Students learned about the internal and external anatomy of salmon and their unique adaptations to a migratory and aquatic life.



NREP BLOSSOMS THROUGH THE YEARS

First created in 1990 with Chris Maun at the helm, the Nisqually River Education Project (NREP) began as an environmental education program housed within Yelm Community Schools. With the inception of the program, Chris pioneered some of NREP's longest running core programs, including the Water Quality Monitoring Program and Student GREEN Congress. Chris also began working with local partners to implement habitat restoration plantings, salmon carcass tossing field trips, as well as founded what's now known as the Summer Institute for Teachers. Programs such as these have been NREP's foundation for its goals and mission, getting students outside and implementing hands-on learning activities.

In 2008, NREP underwent some big changes. Not only did they hire Sheila Wilson to serve as their new Program Director, but they moved out of Yelm Community Schools and in with the Nisqually River Foundation. Sheila had participated in the NREP as a science teacher at Yelm High School and she was very excited for the opportunity to lead the program. NREP continued to diversify and grow, adding on to the core programming with Eye on Nature Explorations at the Billy Frank Jr Nisqually National Wildlife Refuge. Sheila coordinated field trips for every 4th grader in the North Thurston Public Schools to take part in Salmon, Cedar, Canoe, a program which partners with the Nisqually

Indian Tribe. She also guided the NREP into new work with the Tribe's Youth Program, partnering with Wa He Lut Indian School, in an effort to get tribal youth outside for activities such as camping, snowshoeing, river rafting, and horseback riding. Along the way, she added an additional staff member to the NREP team, along with two AmeriCorps positions to assist in delivering the

NREP programs. After leading the NREP for 15 years, Sheila chose to take on a new challenge, leaving to become the Program Manager for the Outdoor Education for All Program at the Office for Superintendent of Public Instruction. She will be missed!

Fortunately for the NREP, the new director was waiting in the wings. Davy Clark has been working for the Nisqually River Foundation for 9 years as the

Education Specialist for the Billy Frank Jr. Nisqually National Wildlife Refuge. While at the Refuge, Davy led environmental education programs for school groups, introducing students to national wildlife refuges and fostering connections with nature. In addition to working with students, Davy also coordinated Refuge volunteers and facilitated trainings for teachers. Davy's experience with environmental education and hands-on learning made him the perfect candidate for the job and he's jumped in with both feet and has picked up right where Sheila left off. We are very excited to see where Davy takes the NREP in the future!



Photo credit: Justin Hall

Chris Maun, Sheila Wilson, and Davy Clark: NREP Directors of past and present.

Nisqually Indian Tribe



Natural Resources Department

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Olympia WA 98513

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Calling all Watershed Citizens!

As conservation work continues throughout the watershed and Washington State, staying up to date on environmental issues, studies, and reforms is important to charting a course for the future of our natural lands. With the goal of lifting community voices, the Nisqually River Council's Citizens Advisory Committee (CAC) is seeking volunteers to join!

The Nisqually River Council (NRC) was established by the Legislature in 1987 with a mission to create sustainability in the Nisqually watershed for current and future generations. With 28 member agencies representing state, federal, tribal, and local governments, the NRC continues to work on protecting the Nisqually mainstem and its tributaries, conserving habitat, and restoring property damaged by development along the river to promote salmon recovery.

As part of the Council, the CAC assures citizen representation during all decision-making and has been an important component of the NRC since its beginning with members valuing the input and suggestions proposed by the Committee and its influence reflected in its three votes - compared to individual votes of other member organizations. The CAC discusses local environmental issues, seeks information, and frequently makes recommendations to the NRC on program topics, guest speakers, and courses of action.

The CAC welcomes new attendees and potential members, especially residents of the watershed and those interested in the work of the NRC! Hybrid meetings take place monthly at the NRC offices on the second Tuesday of each month, 4pm - 6pm.

LEARN MORE & JOIN:

nisquallyriver.org/who-we-are/citizens-advisory-committee

info@nisquallyriver.org