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Infrastructure more than roads, bridges
by Ed Johnstone
NWIFC Chairman

Indigenous tribes existed for thousands of years before we heard the word “infrastructure.” In today’s world, infrastructure includes the roads, bridges, ferries and airports that keep society moving.

Generations ago, we didn’t have these things—the natural world provided what we needed with oceans, rivers, estuaries, wetlands and forests. Natural infrastructure supported our cultures, economies and ways of life.

Manmade infrastructure, along with climate change and an ever-increasing population, has degraded much of our natural infrastructure at the cost of the ecosystem that sustains us and our treaty-protected salmon.

We’re counting on the federal Bipartisan Infrastructure Law to support projects to restore natural infrastructure to boost salmon recovery.

That includes remediation through green infrastructure that protects wetlands, softens shorelines and lowers water temperatures in rivers. And it includes projects to improve fish passage and salmon hatcheries.

In October, U.S. Transportation Secretary Pete Buttigieg visited our state to announce the National Culvert Removal, Replacement and Restoration Program to restore passage in places where fish can’t access spawning grounds. He noted that fish-blocking culverts harm salmon populations as well as the tribal nations and other communities that depend on them.

Treaty tribes have been calling for culvert repair for decades. The state has been ordered by the federal Ninth Circuit Court of Appeals to fix its worst offenders by 2030, but work is behind schedule. There are also many culverts under local government jurisdiction that aren’t covered by the court order but still need to be fixed to protect our salmon. Funding from the National Culvert Removal, Replacement and Restoration Program could speed all this work along.

Tribes also will need federal funding to support the increased workload as our biologists work with state agencies to make sure the barrier removal projects will allow fish passage at all stages of life. We need to make sure that the mistakes of the past are not repeated when the state designs and builds new bridges and culverts.

The Inflation Reduction Act—another infrastructure investment bill—includes funding to upgrade salmon hatcheries, though not nearly enough. As long as our natural infrastructure remains too degraded to support salmon production, we need hatcheries to ensure future generations of salmon.

Collectively, the treaty tribes and the state of Washington operate one of the largest hatchery systems in the country. However, many of these aging facilities are in need of modernization and repair, including new construction, building improvements and upgraded water systems.

Investment in hatchery infrastructure benefits everyone who lives here. Hatchery-produced fish are harvested by tribal and nontribal fishers, and they feed southern resident orcas. Some salmon enhancement programs preserve salmon populations that might otherwise go extinct.

Hatcheries also create jobs, support local communities and contribute to marine-based economies.

Treaty tribes should not have to compete with nontribal entities for funding to fix infrastructure problems that we didn’t create. Still, we’re doing the work. We have millions of dollars’ worth of shovel-ready salmon recovery projects ready to go. We’re counting on our federal trustee to provide the financial support.

As my mentor Billy Frank Jr. once said, “Without the salmon there is no treaty right. We kept our word when we ceded all of western Washington to the United States, and we expect the United States to keep its word.”
Biologists and engineers witnessed chum salmon take advantage of a newly restored tributary to Chico Creek this fall, soon after the streambed was completed.

This work is part of a two-year-long project at the mouth of the Chico Creek watershed to remove its biggest choke points for salmon—a significant fish passage barrier on the mainstem under State Route 3 and three smaller barriers on the nearby tributary—opening 21 miles of upstream habitat.

This is a milestone for both the salmon and the Suquamish Tribe, said Rob Purser, the tribe’s fisheries director. He recalls how salmon runs were abundant in the area when he was growing up but dwindled after the culverts were installed in the 1970s.

However, the watershed is still home to Kitsap County’s most populated chum salmon run, and also supports coho salmon, steelhead and cutthroat trout.

“This work is a step in the right direction,” Purser said. “We know culvert replacements won’t fix everything but fixing the habitat gets us much closer to recovering salmon populations.”

In 2022, on the nearby tributary, a 36-inch-wide metal culvert pipe was replaced with a bridge that spans over a 14-foot-wide channel. The tributary also was realigned to create a more meandering stream, eliminating several stream crossings.

In 2023, on the Chico Creek mainstem under the highway, two 8-foot-wide box culverts will be replaced with a bridge that will allow for a 200-foot-wide span, giving salmon plenty of space to move within the streambed.

“With a fast-moving creek running through small culverts, it creates a fire hose effect, resulting in a degraded stream channel and making it difficult for chum salmon to jump up and swim through the culverts,” said Tom Ostrom, the tribe’s ecosystem recovery manager. “Replacing these narrow culverts with wide streambeds will make a significant difference.”

In both streams, logs and rootwads are being added to enhance fish habitat, and riparian areas are being planted with conifers to provide future logjam material. The restoration work also includes reconfiguring the on- and off-ramps from the highway to Chico Way, eliminating more stream crossings and fish barriers.

This is the fifth major salmon habitat restoration project in the watershed within the past two decades, including others further upstream on Chico, Dickerson, Lost and Wildcat creeks. It also has been one of the top priorities of Washington state in its culvert removal program, which was created to replace nearly 1,000 culverts statewide that have been identified as barriers to fish passage and violate tribal treaty rights by diminishing salmon runs. —Tiffany Royal
More than 140,000 juvenile coho salmon departed the Goldsborough Creek watershed this year, an exciting milestone after the Squaxin Island Tribe and partners teamed up more than 20 years ago to remove a fish-blocking dam.

It’s a new record, and more evidence that the tribe’s determined efforts such as dam removal and ongoing habitat restoration have been a success.

“It’s a trend we’ve been seeing for the last 20 years,” said Daniel Kuntz, a biologist with the tribe, noting the run included 6,000 salmon the year after the dam was removed and has trended upward since then, hitting 140,496 in 2022. “This is a testament that if you invest in the ecosystem, the fish can return.”

The Goldsborough Dam, which was in place for more than 70 years, was removed in 2001 thanks to a cooperative effort between the tribe, dam owner Simpson Timber Co., and local, state and federal agencies. It opened up 25 miles of potential salmon habitat.

“We are excited to keep seeing these runs increasing. This is a barrier removal that had an immediate response,” said Scott Steltzner, the tribe’s environmental program manager.

The removal was a milestone, but far from the end of work that needed to be done. In the years since, the tribe took on several efforts to further restore habitat in partnership with others.

Those efforts included adding wood structures to the creek to give salmon places to feed and find refuge, and replacing fish-blocking culverts upstream of the old dam site, opening 2 miles of spawning and rearing habitat to salmon for the first time in a century. Another partner, the Capitol Land Trust, preserved 320 acres of streamside habitat that would have been developed.

“I think there’s a lot of gloom and doom out there, but there are good examples of where our work is paying off,” Kuntz said. —Trevor Pyle

Estuary thrives with new sediment, vegetation

The mouth of the Elwha River does not look the same as it did 15 years ago.

In the mid-2000s, the river’s mouth and adjacent shorelines were full of cobblestones, dunegrass and brackish ponds.

Between 2011-2014, the removal of two fish-blocking dams on the river released millions of cubic yards of built-up sediment, much of which settled at the mouth of the river, adding nearly 40 acres of new land where vegetation could grow, and completely changing how it looked.

The Lower Elwha Klallam Tribe and U.S. Geological Survey (USGS) have monitored plant growth and sediment conditions in the estuary before, during and since dam removal to see how it has responded to the significant watershed restoration.

A look at pre-dam removal conditions began in 2007, followed with surveys in 2014, 2018 and 2022 to see what vegetation had grown since dam removal, and how new sediment had changed the estuary structure.

“We expected and saw a lot of change and an increase in new surfaces in the river’s delta and estuary with the arrival of all the sediment,” said Patrick Shafroth, USGS research ecologist emeritus. “But over time, we expect some of that sediment to be washed away by wave action and ocean currents.”

Eventually, the estuary will start to look more natural as regular amounts of sediment from the river upstream interact with downstream flows and settle in the intertidal and marine environments, Shafroth said.

Monitoring is taking place at 42 plots in the estuary and includes tracking the amount of visible gravel, silt, bedrock and soil, and estimating vegetation coverage from grasses, wood, mosses, lichen, shrubs, ferns and dead plant material at each location.

Including USGS and citizen scientists in the monitoring has helped the tribe’s natural resources department “keep tabs on what exactly we’re seeing emerge and thrive around the reservation in the ever-changing habitats of the Elwha estuary,” said Allyce Miller, the tribe’s revegetation manager. “There’s always new plants popping up and interesting stories in the ecosystem unfolding out there.” —Tiffany Royal
As the Stillaguamish River and its network of tributary and side channel streams braid their way across the landscape, they don’t inundate as much land as they did before dam-building, pond-creating beavers were nearly eradicated from the Northwest.

The missing link of healthy beaver populations in the watershed has long meant less wetland habitat to support fish and wildlife. As climate change impacts the local water cycle, restoring wetlands is increasingly important to help protect salmon and other tribal treaty resources.

“Our snowpack is declining, water temperatures are increasing, and we know that beavers can help,” said Jennifer Sevigny, wildlife program manager for the Stillaguamish Tribe of Indians.

Because of climate change, hotter and drier Northwest summers raise water temperatures to levels lethal for fish, and wetter winters bring more frequent flooding. Beaver dams can help store cool water during hot summer months and provide a system to absorb water during flood season.

The tribe installed three replica dams in a stream along the North Fork Stillaguamish River last summer to evaluate whether beavers will discover the dams and repopulate the area, and to examine how coho salmon and other fish respond to the altered habitat.

“The Stillaguamish Tribe recognizes the value of wetlands and the species supported by this type of habitat,” said Kadi Bizyayeva, the tribe’s fisheries manager and a Stillaguamish Tribal Council member. “Restoring and enhancing wetlands is an integral part of decolonizing the landscape and protecting our treaty rights.”

Previous studies have shown that juvenile coho and other fish use beaver pond habitat, and the lack of that habitat has impacted coho populations in the region.

Upon completion of the pilot dams, coho were seen foraging in the slow-moving water behind them—a positive sign for the project.

If the project continues to see such outcomes, the tribe—as well as other tribes and organizations—could replicate the process elsewhere as a climate change mitigation strategy.

The tribe is expecting to see the human-built dams improve hydrology, reduce wildfire risk, create complex wetland habitat and assist beavers with recolonizing historic habitat.

The project is building off of a climate change program the tribe created in 2013 and the Climate Change Adaptation Plan that followed with the help of the University of Washington’s Climate Impacts Group.

Through that work, the tribe found that restoring beavers to the watershed could increase the resiliency of fish, shellfish and wildlife important to tribal members.

That led a team from the tribe’s wildlife and habitat programs into the upper watershed last summer to tribally owned property along the North Fork Stillaguamish River. A hydraulic pounder was used in place of a beaver tail to drive posts along three segments of a stream. Branches from area trees and shrubs were then woven between the posts and the structures stabilized with mounds of sediment and stones.

The stream was selected for the pilot project because it carries enough water to support pond development, is surrounded by plants needed for construction and is likely to hold the dams steady through flooding.

“The stream we’re working in is scoured out and so strong that the beavers can’t maintain dams themselves,” Sevigny said.

However, a beaver colony resides about a half-mile upstream, increasing the odds that young beavers breaking away from family units may tend to the human-built dams in the future.

“If beavers come, we hope they will stay and maintain it,” Sevigny said.

For now, the tribe will monitor monthly how water pools behind the dams; how water temperature, sediment depth, groundwater levels and vegetation respond; and how fish use the new habitat.

—Kimberly Cauvel
A Nisqually Tribe study on the effects of gillnetting and releasing chinook salmon has produced promising results, and eventually could open the door for tribal fishers to catch more hatchery fish while still protecting the natural-origin resource for future generations.

“We’ve had shockingly good success using drifted gillnets,” said Nisqually harvest program manager Craig Smith. “If employed, it will increase our ability to harvest hatchery fish while releasing natural-origin chinook.”

The study aimed to determine the mortality rate of chinook caught and released using gillnets. If natural-origin salmon could survive being released from a gillnet, Nisqually fishers could potentially harvest more hatchery fish without impacting goals to preserve stocks.

“It’s a great opportunity to increase harvest of marked hatchery fish while staying under the set impacts on unmarked natural-origin chinook,” Smith said.

Nisqually natural resources staff and fishers conducted a test fishery by drifting gillnets in the Nisqually River for brief periods of less than five minutes each. This technique is the same as the tribe’s nonselective drift fishery, except for the release of the natural-origin chinook.

Weather, water chemistry and other data were recorded, as well as the health of each chinook caught. The chinook were held in mesh bags in the river for 24 hours until their health could be graded again on a five-point scale. All the salmon alive at that point were then released.

The mortality rate for salmon caught in the nets was 10%, a promisingly low figure, Smith said.

“The results were much better than any other gillnet mortality study that’s taken place,” he said.

Studies conducted elsewhere had different conditions, he said, such as longer soak times for the gillnets and warmer water at the time of the study.

The tribe’s study was an outgrowth of an earlier gear study aimed at finding a balance between catch efficiency and selective gear preference of tribal fishers.

While the new study results were exciting, more work lies ahead. The study’s mortality rate figure will be reviewed by the Washington Department of Fish and Wildlife and the National Oceanic and Atmospheric Administration’s fisheries department. The Nisqually Tribe would need to approve any changes or expansion to upcoming fisheries. —Trevor Pyle
For the second year in a row, chinook salmon are going belly up in the South Fork Nooksack River before they have a chance to reproduce. The culprit is again believed to be hot water and low flows.

By the end of September, several hundred chinook carcasses were seen throughout the South Fork Nooksack River watershed, said Tom Chance, Lummi Nation salmon enhancement program manager.

“These fish are struggling,” he said. “We are losing so many before they are able to spawn.”

This die-off follows the 2021 disaster when about 2,500 fish died and dotted the watershed. The fish succumbed to deadly pathogens that thrive in high water temperatures.

The South Fork Nooksack River is known for high water temperatures, a problem that peaks when summertime heat combines with low streamflows.

Portions of the South Fork were listed as temperature impaired under the federal Clean Water Act in the 1990s because of this problem, and additional areas were added to the listing in 2012. With temperatures on the rise and Northwest glaciers shrinking due to climate change, the crisis is likely to get worse without intervention.

“The problem that we’re facing now is habitat. The habitat is not sustaining our runs,” said NWIFC Vice Chair Lisa Wilson, who also serves on the Lummi Indian Business Council. “Last year, our record run of 3,000 salmon ended up dropping down to 500 because 2,500 died on the spawning grounds.”

Puget Sound chinook, which include Nooksack River populations, already are listed as threatened under the federal Endangered Species Act.

The delisting goal for the South Fork subpopulation of the species is to see 9,900 natural spawners in the watershed per year, said Devin Flawd, Lummi’s stock assessment manager. Over the past five years, the average has been about 300—a mere 3% of the goal.

“It has been stated that our salmon could go extinct by the year 2050, and that’s not an option for us,” Wilson said. “That’s not what our ancestors signed up for.”

For its part, Lummi has operated Skookum Creek Fish Hatchery for more than 50 years and, in an effort to stave off extinction of the South Fork Nooksack River chinook, has run a preservation program since 2010.

“We would really prefer our natural runs that we once had, but due to the years of habitat degradation, hatcheries are what we have left to rely on,” Wilson said.

In September, tribal members also turned to tradition, with a small cultural ceremony along the South Fork, where the salmon carcasses are dropping to the bed of the creek too soon—before they have a chance to spawn naturally or to make it to the cold waters inside the hatchery.

Lummi elder Al Scott Johnnie performed the ceremony while elder Ralph Solomon contributed with drumming and singing. Wilson, along with Nooksack Chairwoman RoseMary LaClair and a handful of others, observed the rarely performed ritual to commune with the fish, which are considered kin to these tribes and others in the region.

“We need to keep the fish people returning,” Wilson said, standing on the riverbank near three unspawned salmon carcasses. “When our salmon are sick, so are our people.” —Kimberly Cauvel
The Jamestown S’Klallam Tribe made strides last summer restoring much-needed salmon habitat in the Dungeness River.

The three biggest issues contributing to low salmon productivity have been decades of wood removal, ongoing irrigation withdrawals, and extensive manmade levees, dikes and bank revetments. These issues cut off floodplains and forests from the mainstem, increased water velocities and eliminated recruitment of large wood, said Hilton Turnbull, the tribe’s habitat biologist.

While the tribe has been working to address these problems for decades, 2022 was a year of significant progress, with four projects completed between May and October.

“Over time, logjams and large woody debris have been stripped from the Dungeness River,” Turnbull said. “Our projects are designed to get stable logjams back into the channel to create pools and retain spawning-size sediments and gravels, while also reconnecting off-channel habitat that isn’t currently available to salmon. We are also reconnecting floodplains and channel migration zones by removing levees, dikes and bank revetments.”

The project farthest upstream, the Phase III project at river mile 13, involved three days of helicopters placing logs, rootwads and rock anchors to create 11 engineered logjams in the upper watershed. The purpose was to reconnect the mainstem river with its floodplain and improve spawning and rearing habitat for salmon and bull trout.

Downstream at the Caldero project at river mile 9.5, the tribe installed four logjams in the main channel to slow the river’s velocity and constructed a 750-foot-long side channel replete with salmon habitat.

“The lack of stable large wood in the Dungeness reduces productivity and hurts recovery efforts for federally listed salmon species, especially chinook,” Turnbull said. "Even low volume flood flows have been shown to reduce redd (salmon egg nest) survival."

In 1961, at the current location of the Dungeness River Nature Center at river mile 5.8, a railroad company constructed a 350-foot-long dike to divert the river and block the eastern side of the floodplain. In 2022, the tribe removed the railroad dike and expanded the floodplain to its historical 1,000-foot width. The project also included installing new pedestrian bridges for the popular Olympic Discovery Trail that crosses the river, and adding 14 logjams for salmon habitat.

At River’s Edge, just a few miles from the river mouth, the tribe removed 1.8 miles of a U.S. Army Corps of Engineers levee built in 1964 that constricted river flows and damaged salmon habitat. The levee removal project reconnected approximately 140 acres of floodplain. To protect neighboring properties and the community of Dungeness, the tribe and Clallam County constructed nearly 2 miles of setback levees. The tribe also began planting native vegetation in the reconnected floodplain for a permanently conserved floodplain forest. —Tiffany Royal
Along the North Fork Nooksack River, gravel shores are left wanting—particularly while they bake in the sun during the summer—for the shade, stability and the variety of habitat riverside trees can offer.

Part of the problem is a lack of logjams accumulating naturally because large logjam structures were removed for river navigation and river-adjacent forests were cut down after European settlers arrived.

The Nooksack Indian Tribe is working with partners to put the pieces back together in areas important to threatened Nooksack chinook salmon. One such area is at the confluence of the river’s North Fork and Maple Creek. Whatcom Land Trust owns much of the land along lower Maple Creek, as well as along the adjacent bank of the North Fork, and is a key partner in restoration. Over the summer, the tribe had contractors sandbag, dig, bundle logs and build engineered logjams at strategic locations in the reach.

“It’s a lot harder to put logjams back in than it was to take them out,” said Eric Stover, watershed restoration coordinator for the tribe.

The primary goal is to restore habitat that will sustain and grow the natural-origin chinook population to levels that could again support sustainable harvest. The numbers of returning fish are currently a fraction of historical estimates. An average of 152 adult fish returned per year between 2015 and 2019, compared to historical returns estimated in the 26,000 range.

The chinook of the North and Middle forks of the Nooksack River are a genetically unique population, a subgroup of the broader Puget Sound chinook species protected under the Endangered Species Act. Although the tribe manages a limited subsistence fishery, it hasn’t directed a commercial harvest on this salmon population since the late 1970s.

In the North Fork, the primary factors limiting the growth of the chinook population are shoreline instability and a lack of protected side channel habitat.

When adult fish spawn in this area, their fertilized eggs are left vulnerable to being washed downstream during high flows and flooding. Young fish emerging from those eggs are similarly vulnerable to strong streamflows because of the lack of slower-moving side channels to offer refuge. The restoration underway this year is designed to restore a key element—large logjams—that helps stabilize the river and diversify fish habitat.

The latest phase of construction brought 17 logjams to about a half-mile segment of the river and its floodplain near the town of Maple Falls. In 2021, the tribe built 22 logjams in a 0.3-mile span of the river downstream of the newest work site.

The logjams have proven to be sturdy additions to the river system, surviving even the flooding that swelled the river in November 2021, Stover said. This latest work in the Maple Creek reach marks the tribe’s 22nd logjam restoration project.

—Kimberly Cauvel

 contractors installed logjams along the North Fork Nooksack River over the summer, when the fewest vulnerable fish were in the river.

Replenishing wood habitat for salmon

“...it’s a lot harder to put logjams back in than it was to take them out.”

Eric Stover
Watershed restoration coordinator
Nooksack Indian Tribe
Water sloshed from the back of a truck as it made its way from the confluence of Sutter Creek and the Skagit River to the Marblemount Fish Hatchery upriver. At its destination, the cargo inside—a swirling mass of fins and tails—cascaded into the hatchery’s protected waters.

About 130 adult fish were trucked from river to raceway that day as part of a new Skagit River chum hatchery program the Upper Skagit Indian Tribe is helping get off the ground.

Chum salmon historically sustained Upper Skagit ancestors through winter as the last fishery of the year. The number of chum returning to the river to spawn sharply declined in the early- to mid-2000s. Despite the closure of all treaty and nontribal fishing since 2007, Skagit River chum have continued returning in low numbers.

The new hatchery program is co-managed by the Skagit River treaty tribes—Upper Skagit, Sauk-Suiattle Indian Tribe and Swinomish Indian Tribal Community—and the Washington Department of Fish and Wildlife (WDFW).

“With the decline of Skagit River chum salmon, we wanted to provide a boost to the naturally spawning population,” said Bob McClure, the Upper Skagit Tribe’s harvest management biologist.

The partners are collecting adult chum—also called dog salmon, in part because of the long teeth developed by spawning males—as broodstock to spawn at the hatchery. They will then rear the offspring until the fish are ready to be released into the river.

“The Upper Skagit’s goal is to see the dog salmon return to its historical place of significance in our culture,” said Scott Schuyler, director of the tribe’s natural resources department.

Hatchery programs can be essential when, despite harvest restrictions, populations don’t recover on their own.

Hatcheries circumvent many threats to salmon in the wild, including flooding that can damage fertilized eggs and predators that eat small fish. And the more young fish that leave the river for their journey to sea, the more are likely to escape ocean fisheries and predators and complete the journey back.

“We are working cooperatively with the state and the other tribal co-managers to augment and rebuild the Skagit chum natural run,” McClure said. “We’ve got some federal funding to assist in jumpstarting the Skagit chum hatchery program with the ultimate goal of rebuilding the natural run to a size where we no longer need the hatchery program.”

From October through December, a team from the Upper Skagit Natural Resources Department and WDFW fished a section of the river between Rockport and Marblemount, sorted fish by sex, and hauled them one at a time from the water’s edge to their special cargo hold.

The goal is to provide the federally approved hatchery program up to 500 fish in odd numbered years and up to 1,600 fish in even numbered years, in accordance with fluctuating run sizes. The tribe is helping catch the fish and WDFW is delivering them to its Marblemount Fish Hatchery where state agency staff will spawn, incubate, raise and release the chum as they grow.

As of the start of December, the tribe provided 913 chum for the program this season. —Kimberly Cauvel
Throughout the region, treaty tribes are replacing and expanding aging hatcheries. Other tribes hope to do similar work in the future.

Changes in 2022 included the installation of new equipment at the Tulalip Tribes’ hatchery and the start of construction of a new hatchery for the Port Gamble S’Klallam Tribe.

At the Tulalip Tribes’ hatchery, new and expanded infrastructure will enable it to support more salmon each year, overcoming longtime seasonal water supply issues.

Meanwhile, the Port Gamble S’Klallam Tribe continued to spawn salmon this fall—delivering fertilized eggs to the Quilcene National Hatchery—during construction of its new Point Julia hatchery. The original facility was built decades ago.

—Northwest Treaty Tribes staff
Examining where purple urchins thrive

Hordes of slow-moving prickly purple urchin that creep along the seafloor can easily wipe out a kelp forest.

The Makah Tribe is working with the state Department of Fish and Wildlife to track such nefarious activity in the Strait of Juan de Fuca. The co-managers are concerned by the barren areas that are left behind on the seafloor when an overabundance of urchins devour the kelp forests.

The state reached out to the tribe a few years ago to explore what appeared to be developing urchin barrens, a problem that is well known along the coasts of California and Oregon, said Adrianne Akmajian, the tribe’s marine ecologist. Together the state and the tribe are conducting annual population surveys and sampling, in part to compare the health of urchins living in healthy kelp forests versus in these apparent barrens.

“Divers have been seeing large areas that are pretty dense for urchins,” she said. “We are concerned that if these barren areas continue to grow, we may see loss of kelp forests like they have farther down the coast.”

Kelp forests are an important habitat for a variety of marine species, including rockfish, juvenile salmon, crustaceans and others that are important as a prey base for the ocean food web and fisheries. Urchin barrens deprive these species of refugia and feeding and spawning grounds.

Shrinking kelp forests compound the problem, with less healthy kelp leading to more starving urchins. Research conducted in Oregon and California indicates that urchin barrens form quicker when there are more starving urchins. Hungry urchins change behavior from hiding between rocks to roaming on the seafloor, searching for food.

While urchins are important to the tribe—its gonads are considered a traditional food—they’re not worth harvesting if their gonads aren’t mature enough to provide a meal, Akmajian said.

This fall, state divers collected samples from subtidal sites near Neah Bay and the tribe collected urchin samples from an intertidal location on the reservation. All samples were processed and weighed in the tribe’s fisheries lab.

“You get a relative proportion of how big their gonads are compared to the size of the urchin test, or skeleton,” Akmajian said. “In theory, in a healthy urchin you would see a greater ratio of gonads to test compared to an urchin from a barren where they are no longer feeding or there isn’t food available. We’d expect a smaller gonad to test ratio.”

The state is collecting urchin data from the subtidal areas and the tribe is looking at intertidal areas. While the subtidal areas may have abundant kelp forests, intertidal areas can have more free-floating vegetation due to wave action on the rocky shoreline. This difference may help keep the urchins well fed in intertidal areas, even in high densities.

“At an intertidal location, if there are a whole bunch of urchins, is that considered a barren like when we see large aggregations in the subtidal?” Akmajian said. “How do their gonad-to-test ratios compare to those in the subtidal areas where the divers are collecting them?”

To further help with the surveys, the tribe also is exploring using a remote-operated vehicle (ROV), which could be dropped into the water and controlled from the boat. Using an ROV would allow the boat to stay out of kelp beds and away from underwater rocks. The tribe also hopes to expand their surveys to other intertidal sites in 2023.

—Tiffany Royal
Spawning salmon
Fall brings surveys, egg and milt collection

Above, from left: Jon Oleyar, fisheries biologist for the Suquamish Tribe, walks Grovers Creek during an instream chinook salmon spawner survey in October. Brandon Smith, hatchery technician for the tribe, lifts a chum salmon at the tribe’s Grovers Creek Hatchery in November. The annual spawning each fall supplies the tribe’s hatchery program with the next generation of fish. Tiffany Royal (2)

Tribe, partners still fighting fish-blocking dams

As Seattle seeks a new 30- to 50-year license for its Skagit River Hydroelectric Project, the Upper Skagit Indian Tribe is calling for changes.

The tribe previously asked for fish passage to be considered, including the possibility of removing Gorge Dam, the lowest of three across the river.

Construction of Seattle’s Gorge, Diablo and Ross dams in the early 1900s cut off migratory salmon and steelhead from upwards of 40% of the watershed. In the years since, the river’s chinook salmon, steelhead and bull trout populations, as well as the Salish Sea orca population that eats the region’s salmon, have declined to the point that each has been listed under the federal Endangered Species Act (ESA).

“The Skagit is not producing salmon at the level that it should be,” said Scott Schuyler, director of the tribe’s natural resources department. “We’re already at 100 years with no fish passage, and we have generations who haven’t been able to participate in some of these fisheries.”

The tribe is not alone in asserting that fish passage through or around the dams could restore salmon and steelhead access to habitat and provide a much-needed boost for the populations listed under the ESA. Staff from NOAA Fisheries and the Washington Department of Fish and Wildlife are among many agencies and organizations who echo the Upper Skagit Tribe’s request that Seattle study and implement fish passage measures.

“It’s undeniable that fish passage is going to need to be a component of the license,” said Brian Lanouette, Upper Skagit fisheries scientist.

The addition of fish passage at hydro-power dams and the removal of dams entirely is increasingly common across the Pacific Northwest where salmon—and the ecosystems and people connected to them—have been struggling.

“There are many moral, legal and scientific reasons Seattle should be doing this,” Schuyler said. “And how satisfying would that be, to see fish coming into these reservoirs, spawning and reproducing?”

—Kimberly Cauvel
In the coming years, when camas is flowering, trees are growing and straw-berries are ripening on the banks of the Quillayute River, students from the near-by Quileute Tribal School will be able to see the results of their work.

Students visited the site of the Quileute Tribe’s Reach III Restoration Project in November to plant vegetation, a key part of the long-sought project.

Students tromped into a muddy area to plant Sitka spruce and western red cedar that can grow to impressive heights. They also planted common camas bulbs, wild strawberry plants and Pacific silverweed that someday will flourish.

Quileute Tribal School teacher Alice Ryan said it was a special opportunity for the 57 students—from grades 7-12—who took part.

“If you want to change how students see the land around them, we need to bring them back to a sense of stewardship,” Ryan said. “If they have a hand in planting and then see their work grow, the hope is that they will take some personal pride in it and take care of it, even so much as stopping others from polluting or harm-ing the land that they worked hard to help restore.”

The field trip was part of a growing curriculum built around Quileute tribal culture and designed in consultation with tribal elders, community members and school staff.

The Reach III Restoration Project included the installation of 13 large engineered logjams and 40 habitat logjams to provide more fish-friendly habitat and prevent the river from further eroding its banks.

The students’ work on the revegetation phase of the project wasn’t ornamental; it’ll serve a crucial purpose, said Caroline Walls, the tribe’s habitat restoration biologist.

“Replanting the areas we disturbed with the restoration project is vital to restabi-lizing the soils and preventing invasive weeds from moving in,” she said. “We chose plant species that do well in this area and have cultural uses.”

In addition to ownership in the project, the students benefit from a glimpse at natural resources work that could eventually become a career path.

“What we started in 2019 is going to be a 100-year project through the whole watersheds,” said Nicole Rasmussen, Quileute water quality biologist. “There are career opportunities all over—writing grants, monitoring water quality, being a biologist. It exposes them to career options.”

—Trevor Pyle

**Education & Partnerships**

**Planting seeds for budding careers**

Hands-on restoration gives students a glimpse of job possibilities

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**Alice Ryan**

Quileute Tribal School teacher

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Above: Quileute habitat restoration biologist Caroline Walls, left, and Quileute Tribal School student Teresa Schwagel plant a tree on the banks of the Quillayute River.

Right: Quileute Tribal School student Alexandria Palmer holds a sapling while student Denise Ward-Bender works a shovel at the tribe’s restoration project. *Trevor Pyle* (2)
The Quileute Tribe and the Clallam Conservation District joined together in November for a restoration project during Orca Recovery Week.

Staff with the tribe’s natural resources department teamed up with community volunteers and the conservation district staff to plant trees on tribal land along the Quillayute River.

On a sunny, dry day, more than a dozen people fanned out and spent hours planting cedar and Sitka spruce near the river. They also inspected a previous planting and, when necessary, replaced plant protectors to guard growing trees against rodents.

“This is the second time we partnered to do a project for Orca Recovery Week,” said Quileute water quality biologist Nicole Rasmussen. “It’s very cool. You get engaged landowners there, and it’s a chance to engage with the community.”

The effort this year built on an ongoing restoration project on a 58-acre plot of land fronting the river. Purchased as a site for an addiction-recovery treatment house, the tribe enrolled the property in the conservation district’s Conservation Reserve Enhancement Program, which funded more than 30,000 trees and shrubs. The plants will provide much-needed shade for salmon, and offer nutrients, bank stability and the future addition of wood.

Fallen trees will eventually benefit salmon, including creating pools for refuge and attracting macroinvertebrates to eat, said Quileute habitat restoration biologist Caroline Walls. The salmon then go on to serve as food for southern resident orcas.

“Trees and wood are related to salmon, and salmon are related to orca because that’s the primary food source of southern resident killer whales,” Walls said. —Trevor Pyle

Above: Quileute habitat restoration biologist Caroline Walls plants a tree as part of an Orca Recovery Week event in partnership with the Clallam Conservation District.

Below: Quileute water quality biologist Nicole Rasmussen works at the site of the ongoing restoration project. Trevor Pyle (2)

A school on the move

The Quileute Tribe’s Move to Higher Ground initiative achieved a milestone last summer with the blessing of the new Quileute Tribal School in August.

The tribe’s previous K-12 school was on a former U.S. Coast Guard site between the Pacific Ocean and Quillayute River, only a few feet above sea level and threatened by tsunamis and storm surges.

That threat has now been warded off thanks to a decades-long effort by the tribe and partners to build a new school in a safer location.

“It will definitely be a better learning environment not having to worry about an earthquake or tsunami hitting us,” said Lizzie, a student who attended the previous school for five years. The new Quileute Tribal School opened in the fall. Photo: Archie Black

Tribe, conservation district partner for orcas

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Makah tribal member Dale Johnson Sr. died Oct. 22. He was born Dec. 1, 1942, to Percy and Lorraine Johnson. He later married Beverly “Jean” Johnson.


Johnson also served on the NWIFC executive board from 1978-1982, as chair and vice chair.

From the late 1970s to the early 1990s, he led the effort to restore the Makah halibut fishery, by attending annual International Pacific Halibut Commission meetings and persuading U.S. and Canadian fishery managers to recognize the Makah treaty right to halibut.

When the Makah longline fishery began in the late 1980s, Johnson took the lead in successfully harvesting the halibut allocation and later helped establish black cod and whiting fisheries.

He was preceded in death by his wife, father, mother, and siblings Ron Johnson, Barbara Johnson and William Johnson.

He is survived by his children Dale Johnson Jr., Steve Johnson and Lauri McCaulley; siblings Keith Johnson and Glenn Johnson; grandchildren Amanda Jimmicum, Ashley Johnson, Lesley Johnson, Nicolas Johnson, Isaiah Johnson, Xavier Johnson, Tyler McCaulley and Gina McCaulley; 15 great grandchildren; and many aunts, uncles, cousins, nieces and nephews.

Walking On

Dale Johnson

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Seven Generations

Olympic athlete Billy Mills, Oglala Lakota, visits the Swinomish Tribe’s fish trap in August 1971 and takes a turn pulling the net while tribal member Landy James, left, looks on.

The fish trap in Skagit Bay off Snee-Oosh Beach was built in the 1930s to harvest salmon for the tribal community and as an economic venture. It is believed to have been the only fish trap operating in the country for more than 30 years until it was discontinued. The structure was destroyed during a storm in 2000. Swinomish Tribal Archive