FREE
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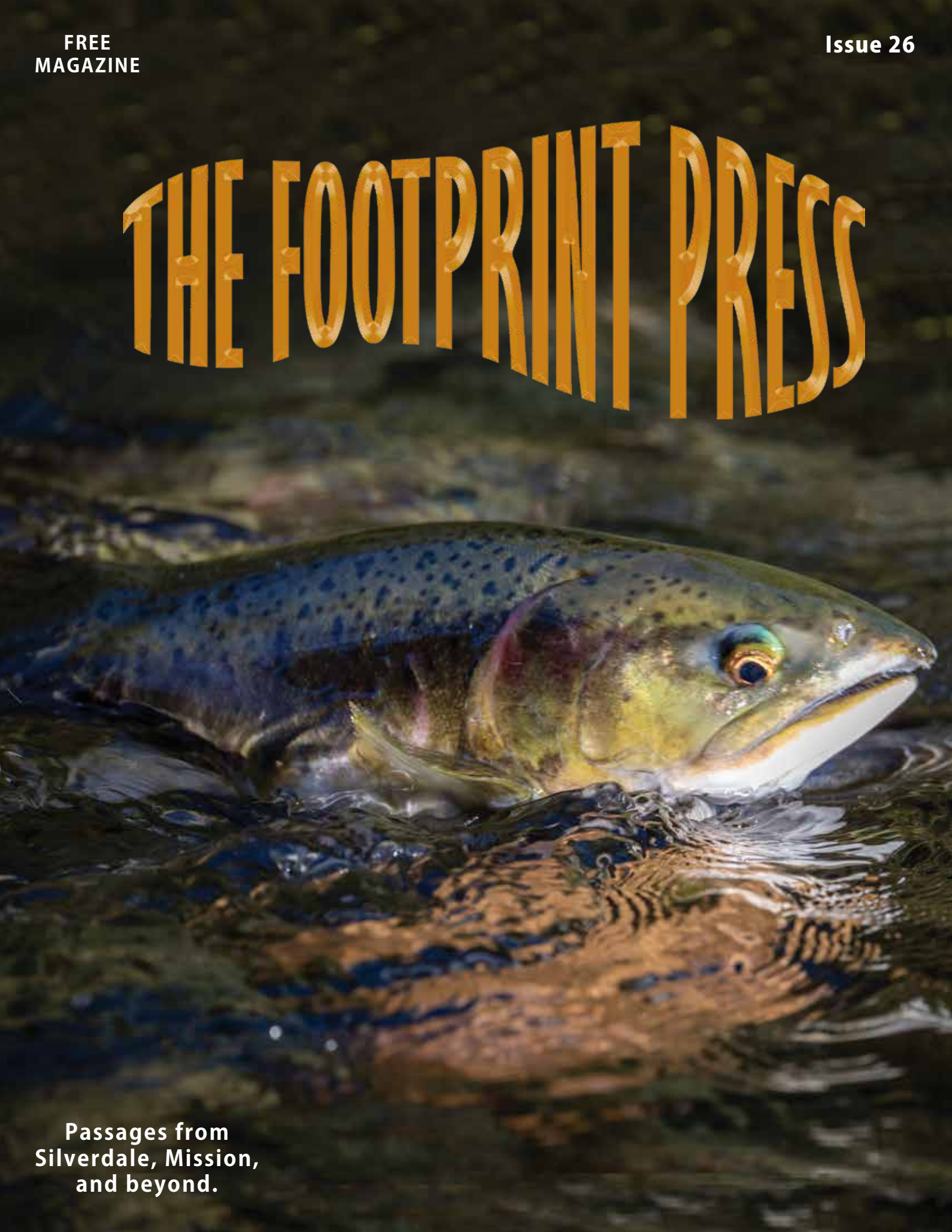
Issue 26

THE FOOTPRINT PRESS

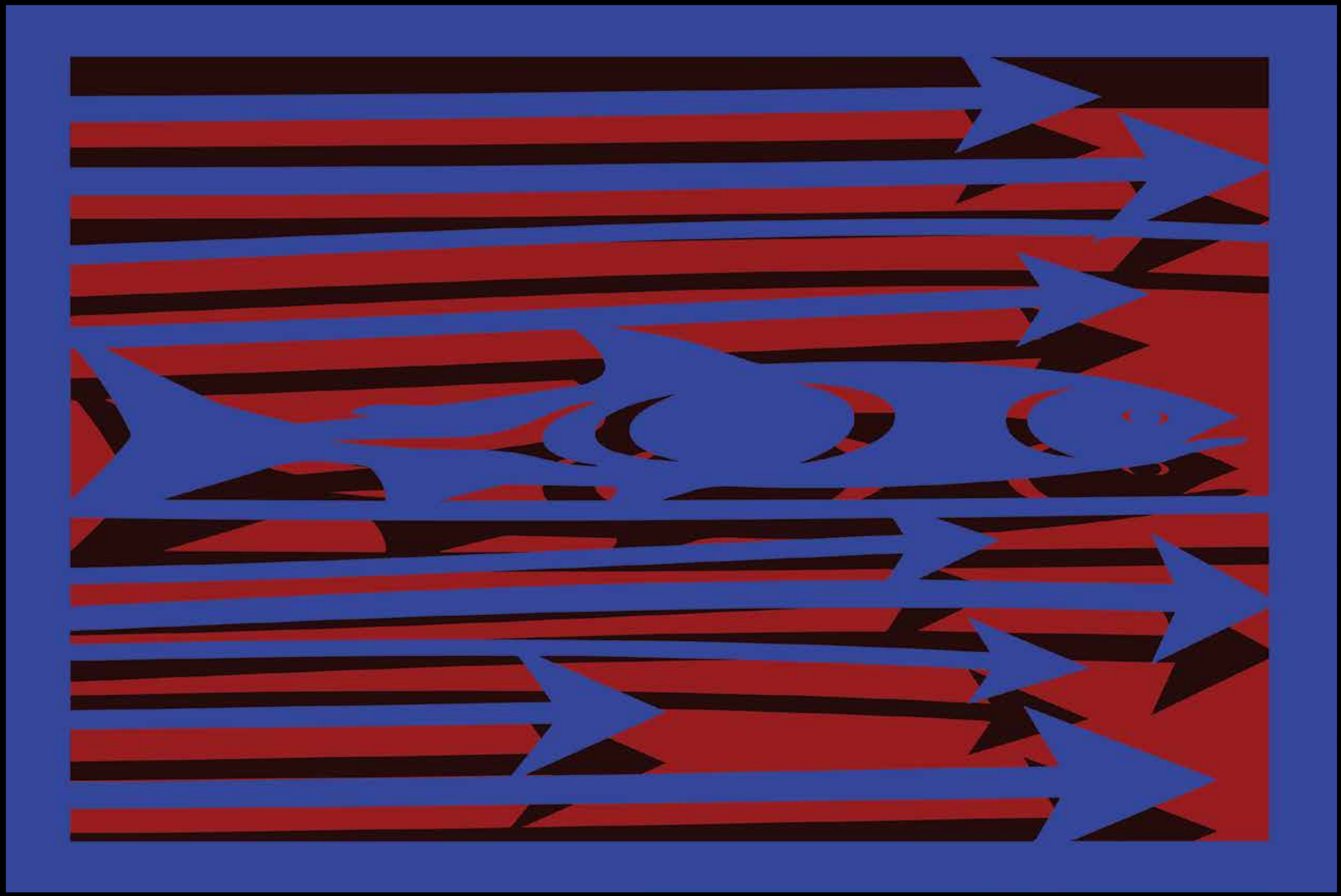


Passages from
Silverdale, Mission,
and beyond.

Message from the Editorial Committee

Wild salmon are creatures of the ocean, the rivers, and the forest. As they move through each of these habitats, all life around them benefits. Wild salmon mitigate some of the impacts of climate change on biodiversity by passing on energy and nutrients to other life forms. While in the ocean, they are a critical food source for Orca. Rivers, streams, creeks and wetlands give the salmon passage through to the forests where their lives are tightly woven with those of countless terrestrial species. Indigenous people of the river have always, and still, depend on wild salmon for a healthy traditional diet, cultural practices, and much more. It is clear that without wild salmon, the incredible biodiversity of the Fraser Valley ecosystem would not be possible.

Wild salmon will continue their essential life services for as long as their habitat remains healthy. Protection and restoration of salmon habitat by ensuring our oceans, forests, rivers, creeks and streams are not lost or polluted by industry or development, is a small price to pay for the awesome power of wild salmon.



Salmon arrow shadowbox by Ronnie Dean Harris, Stō:lo/St'át'imc/ Nlaka'pamux, multimedia artist
https://www.ronniedeanharris.com

Cover photo: Female Pink Salmon (Oncorhynchus gorbuscha) in spawning coloration, by Sharron Palmer-Hunt
https://takingtimephotography.com

Special thanks to Molly Tilden for her editing assistance.
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Orca in the Fraser River

I was at my childhood home on the Whonnock Reserve with three of my high school friends. Our house was on the hill overlooking the Fraser River, directly across from the middle of Crescent Island. It would have been late spring or early summer. I cannot remember the exact date or time of day, but I was born in the year of 1955, and I was 15 years old, so it would have been 1970 when this happened. I remember that it was a clear and sunny day and it was early afternoon. I am not sure which of us noticed the whales first. What caught our attention was the spouts of water that happen when they came up to take a breath. We could clearly see from our vantage point and watched them 'till they passed out of sight! Over the years I have reached out to my companions who were with me that day and asked if they remember what we saw. We have all agreed that we saw Orcas (killer whales) that day in the Fraser River! I believe this to be a very rare thing to witness. In my adult years and most of my childhood I have lived on, and worked on, the banks of the Fraser River. I have also spoken to many of my contacts over the years, some who live within site or on the banks of the Fraser River or worked daily on the river. No one I have talked to has ever seen Orcas or any other type of whale in the fresh waters of the Fraser River! There are, however, ancient local Indigenous accounts of this happening. To commemorate what I saw that day with my friends I have painted Orcas on my cedar fence. I will complete the painting this summer by adding the school of salmon the whales were chasing.

Peter Wayne Gong, Squamish Nation Artist

Importance of beaver dams to Coho salmon

Some people believe it is imperative to remove beaver dams in salmon and trout streams because they seemingly comprise obstacles to migration for adult and juvenile fishes in these kinds of watercourses. Dam removal has also been a policy often followed by various agencies in British Columbia and across North America, including municipalities, property owners, and others engaged in land development, in order to reduce the associated flooding on landscapes.

I argue, however, that this view is a deeply flawed one if you want to save and protect Coho Salmon and other such species that use these habitats.

This opinion, that there is a critical linkage between ecosystem health and the production of salmonids, and the abundance and quality of beaver dams, is not solely mine, but has been repeated over and over in the emerging scientific literature. Moreover, I have often been completely surprised at the number of locations where I have sampled juvenile Coho Salmon, where it seemed to be impossible for them, or their parents, to access because of high beaver dams in downstream locations. That is, I still found significant numbers of these young fish within the habitat upstream of these so-called barriers.

Juvenile Coho Salmon need a year of rearing in freshwater before they go to sea as smolts and extensively use beaver ponds for rearing when they are available. From my perspective, with more than forty years and hundreds, if not thousands, of hours spent assessing juvenile salmonids for my work or study, I have repeatedly observed the strong interrelatedness of beavers and their dams and the productivity of such habitats for Coho Salmon.

For me, the first time that this issue really struck home was in 1974 while I was an undergraduate at Trinity Western College (TWC), training to become an aquatic scientist. It was there that I first encountered beaver dam/Coho Salmon interactions and was astonished to see how important the former is to the production and health of the latter. As background, the Salmon River flows through the TWC property in the Township of Langley, and enters the campus under the rail tracks from a large, wooded area south of the tracks. Upstream from the tracks were a significant number of beaver dams. I recall that one dam, in particular, was very large and upstream of it formed, what almost seemed to be, a small lake. Vertically, from the stream bottom to the top of the dam was about a meter and a half to two meters. It was big!

From recollection, the fall of that year was very dry and a substantial number of adult Coho Salmon came into the river that autumn. They were clearly having problems accessing the upstream spawning beds due to the beaver obstructions and I watched them, day after day, nervously circling, not going anywhere. There was no spawning habitat, to speak of, downstream of these dams. Most poignantly I watched a female Coho Salmon, finally out of sheer frustration, frantically starting to try to dig her redd (nest) in the clay hardpan, below the dam.

But, then, this all changed in almost an instant.

One night, in mid-October, the fall rains started to pound on the roof of our dorm. The next morning, when I went back to the river, the flows had come up and there were Coho Salmon jumping, nose to tail, and moving like a conveyor belt of fish over the dam through a slot of water that had been created by this relatively small rainfall event. This amazing scenario lasted for only a few hours while the river was at its peak discharges. And then the whole wild event was over and the fish were gone, well upstream of the dams. It was like a 100 yard dash for these fish, moving rapidly and in great numbers into their spawning habitats.

What really struck me at the time was that if I hadn't been there at the dam at the exact right time, I would have missed this marvelous migration event. Most importantly, I would have wrongly considered the dam to be a complete impasse for fish movement. But these fish persisted, and waited, and then made it over the beaver dams which were ultimately not a barrier to migration. Coho Salmon are evolutionarily adapted to use these rain events to get to where they need to spawn, and in beaver dam-rich streams, and "know" how to wait and be patient in the face of seemingly apparent obstructions.

It is important to realize that in the 1970's and/or 1980's, DFO escapement and catch statistics showed that this relatively small watershed, known as the Salmon River, flowing through the Township of Langley, was the second most important watershed for Coho Salmon for the lower Fraser River and Georgia Straight harvests. My view is that this had a lot to do with the large network of dams and wetlands in the Salmon River drainage that were still around in Langley then. Moreover, these critical wetland habitats that beavers provided for rearing juvenile Coho Salmon were the dominant reason for this high level of production.

Following that experience I can clearly recall encountering other locations, over my career, throughout coastal and interior British Columbia where large beaver dams should have blocked both adult and juvenile fish over the years, but this species thrived under such conditions. These include Nathan Creek (c.a.1977 or 1978), Blue River area and the Albreda River—North Thompson River drainage (1983), and Coldwater River (Coquihalla Highway construction), (c.a. 1985). Each time beaver dams looked as though they should have impeded either adult or juvenile Coho Salmon, visual observations, minnow trapping and electroshocking sampling showed that they clearly did not provide any significant impediment to fish usage.

Scientific studies show that juvenile Coho Salmon absolutely love rearing in swampy, beaver-dam laden areas, that have slow waters and highly productive insect populations. Historically (pre-European influence) the Fraser Valley and much of the interior of the province would have been a vast network of wetlands maintained by beaver dam construction. With the beaver population so vastly overharvested for the fur trade in the 1600-1800's, and with the extensive land development and wetlands draining that has occurred since that time, the great majority of the area's beaver-habitat wetlands have been lost in the range of Coho Salmon in our province. It is very clear that Coho Salmon are not normally spawning-habitat limited but they are rearing-habitat limited, and beavers create the perfect habitat for Coho rearing. But, Coho Salmon are not the only species that live in and around beaver ponds. Many other aquatic species are also dependant on beavers and their dams beyond salmonids and fishes including plants, invertebrates, fowl, amphibians, reptiles and mammals. Beavers play key roles in water stabilization, nutrient maintenance and maximization of wetland ecosystems.

Beaver dams and their ponds need to be protected as a critical ecosystem attribute in the lower mainland of British Columbia where we have probably lost over 99% of all of these historic habitats. Moreover, for those who think they are doing a good thing for salmon by removing beaver dams (I am guessing that) for 99.99% of the obstructions that have been destroyed or disturbed in streams where Coho Salmon live, people actually have never taken the time to sample (i.e., minnow trap) above the barrier in order to see if juveniles are already in this habitat, and, thusly, whether their parents had actually made it over the dam the previous fall. In short, the removal of beaver dams, whether to reduce wetland flooding or (in ignorance) to allow adult or juvenile fish to move upstream, has caused an enormous amount of critical habitat destruction in British Columbia.

While very little focus has been placed on the effects of this destructive activity in our province, it is my opinion that these sorts of activities have significant legal implications. It is illegal to destroy fish habitat in Canada without an authorization under Section 35 of the Canada Fisheries Act. It is very clear to me that any disruption or harm to beaver dams should be considered by the authorities as a serious violation under the Canada Fisheries Act and full penalties should apply to people who harm, destroy or disturb such critical features.

So, please don't ever take out beaver dams or disrupt them in any way! Altering beaver dams is one of the absolutely worst things that anyone can do for the recovery of wild Coho Salmon populations. Coho Salmon and beavers are all evolutionarily co-adapted for millions of years. Beavers create absolutely critical rearing habitats for this fish species, and without their dams, Coho Salmon populations are profoundly diminished in our province.

Dr. Marvin L. Rosenau, B.Sc.(Hons.), M.Sc., D.Phil.
Instructor in the Fish Wildlife and Recreation Program at the British Columbia Institute of Technology (BCIT).

Coho lodge painting by **Riley Charters,**
BFA, Interior Salish~ Merritt Area
www.facebook.com/Riley-Charters-Ethnology-Art-102720199779386/

Photo taken on location at the lower Stave river, Mission

Beaver photo courtesy **Mike Stefiuk**

Returning to the Fire-side for the Salmon and the People

Spring spirit by **Jolene Andrew**
https://www.instagram.com/jo_joandrew/

As long as the salmon survive, so will we. Salmon that comes through our Widzin Kwah (the Bulkley River) used to come by the millions. The life in the land, sadly, is being destroyed, and as a result, the life in the people is also being destroyed. The most recent threat comes from the controversial and divisive Coastal GasLink pipeline, stretching from northeast British Columbia to Kitimat. Within this swath of land lies 22,000 square kilometers of unceded Wet'suwet'en land.

Despite that so many have been laid to rest due to poor health, poverty, addiction, suicide and oppression, Indigenous people are rising. I witnessed my Wit'suwet'en elder Sue Alfred say, in a feast, back in 2018, "We are returning to the fire-side." Wit'suwet'in leaders, and many other nations across Turtle Island, for generations, have been the first line of defense against governments and corporations who threaten the health of our waters and eco-systems, including our salmon. We are returning to the land and healing. As healing is catching like fire, we hope this will also heal the land, like the sentiment expressed by the Unist'to'ten, "Heal the People, Heal the Land."

During this global pandemic, I think of the warning our prophets and ancestors passed on to us. The signs have never been more real. The truth always becomes clear, and balance will always be found. Our elders would say, "We always knew the white man was coming." They would talk about the glacier on 'Hudson's Bay Mountain'. Once it's gone, that would be a sign to be prepared to return to the mountains. As a child, the glacier filled the whole Mountain basin in the full heat of summer. Last summer, the glacier looked like no more than a pile of snow and dirt from the valley.

'C'isnic' meaning greedy and selfish, is the poison that drives capitalism and industry to take more than is needed, while the globe keeps warming and our salmon, and other vital species, are having their migration corridors destroyed, and forests and rivers changed. The time to build resilience and do what's necessary has always been at the fingertips of the Wit'suwet'in people. To never forget the hard work necessary to carry on in the steps of our ancestors. That hard work needs to happen at all levels of governments and communities. Our grandparents, and ancestors, orchestrated their responsibilities over vast territories, understanding how to negotiate and conduct our social business in a respectful and meaningful way. In this global pandemic we are negotiating change faster than ever before. We are negotiating daily our every action – to protect our families.

It is in our Wit'suwet'en customs to ensure everyone is provided for. Our 'Anuc-Niwh'it'en (our laws) guide us. The foundation of our 'Anuc-Niwh'it'en is 'Wiggus' which means respect. We have a strong reverence and respect for the life in the land and the life that feeds us and our spirits. *"If you know the territory well, it is like your own skin. Sometimes you can even feel the animals moving on your body as they are on the land, the fish swimming in your bloodstream…If you know your territory well enough you can feel the animals."* Mikhlikhlekh (Jonnny David)

If our land is hurting, we hurt too. We see it with our missing and murdered. We see our children hungry and our elders very poor. If we could imagine a future where we had rightful access to our lands and salmon, would we have so many missing or gone, to suicide or the opioid crisis? Imagine a future where the salmon were strong and protected and pure. We have a story, when a boy did not respect the salmon, and the river took him. Foolishness and careless behaviour result in disaster. We are in a disaster. The ones that are fighting for their rights, their rights to clean water and rights to a moderate livelihood, are villainized and criminalized.

Who is responsible for that?

Many of our people now choose industry because they are pressured to conform to the global industrial model of living, so their children don't go without. Indigenous leadership is needed now. Our land has been stolen. Our people have been murdered and oppressed. Yet Wit'suwet'in leaders are still being generous and, even more so, understanding. They face our current challenges with grace and courage, so we can continue to care for one another as we always have.

Jolene Andrew,
Wit'suwet'in Artist and Community Planner
Luksilyu Clan, (Small Frog)
from The House of Many Eyes
Raised in the Village of Witset,
residing in Coast Salish Territory

The Spirit World mask by Rocky LaRock
1 (604) 491-ROCK
rockylarock@live.com

A Drop in the Bucket: Coastal Tailed Frogs

I plunge my hands into the cold mountain stream, one hand gently lifting up rocks to look under them, the other holding a green aquarium net downstream. As I pick up the rocks, I watch carefully for a dark streak to slip into my net, pushed downstream by the natural flow of water. Once in my net, I transfer the small creature into a bucket filled with cool water with its other relatives. My search is complete, and I turn to the bucket to measure these amazing creatures.

At a quick glance, these little individuals remind me of leeches, particularly because they suction to the bottom rocks with their mouths to avoid getting swept away by the current. But up close, they're clearly tadpoles, with dark bodies and a bright white spot on their tails.

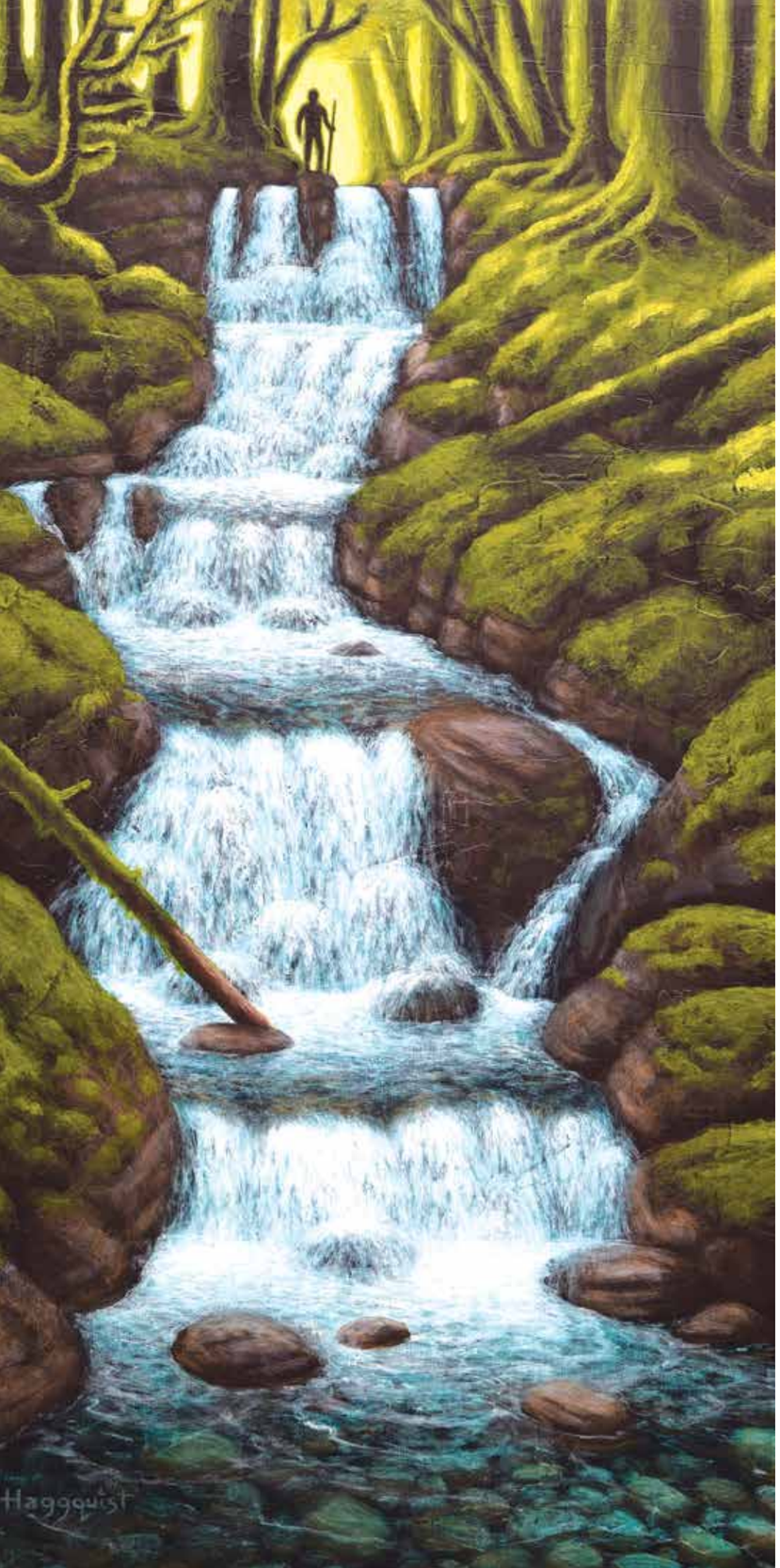
Not all tadpoles live in ponds and wetlands like I used to believe. The Tailed Frog is the only species of frog in North America whose tadpoles hatch and live in mountain streams.

In the Pacific Northwest,these frogs can be found in steep mountain streams ranging from Northern California to the middle of British Columbia. The most surprising fact I learned about Coastal Tailed Frogs was that the tadpoles can take up to four years to become young frogs, unlike other frogs that only take a couple of months. So why in the world do these ones take so much longer? After a summer of searching for them, I understood clearly why - the water they live in is cold! These little tadpoles feed on algae, which grows slowly in the cold water, so they can't get enough food in one summer to transform into frogs and leave the stream.

What I love about these little tadpoles is that in one survey I can see all the stages of transformation. First the young ones grow their front legs, then their back legs. My favorite stage is just before their mouths change, and they look like a frog with a long tail, but still have their suction cup mouth. Eventually, their tail recedes into their body, and they lose their sucker mouth, ready to leave the stream.

I turn back to the bucket, and to my delight, spy a fully grown adult sitting on a moss-covered rock. I gently pick him up to take a closer look. He stares back at me silently, unable to make noise, while his claw-like feet grip my fingers strongly. I can imagine the purchase they give him when moving around in the stream, and crawling up the steam banks. This one is a deep brown colour, although I have seen other adults that are green, or even a pinkish colour. His thumbs have a dark raised patch that he'll use to help him grip a female when he mates with her, indicating that he is at least 9 years old and ready to reproduce. But if I was ever unsure of the sexual maturity of this frog, his tail would have quickly dispelled any doubts! This is another unusual characteristic, used for internal fertilization with the females, more like humans than other frogs, where the female releases her eggs and then the male fertilizes them.

I release him gently onto the stream bank and return to collecting information for my research. These frogs are listed as Special Concern by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and also listed as Special Concern under Schedule 1 of the federal Species at Risk Act (SARA). However, they were



down-listed from blue to yellow (ie. least risk of being lost) in 2016 in BC, because since their status was first determined, scientists have found them in many more places, making them more common than first expected.

Despite being down-listed in BC, there are still threats to their habitats. One of the threats I am investigating with these frogs is the potential impacts of small hydropower projects on their populations. Since tadpoles rely on the stream for a home and food for multiple years, the diversion of water could reduce habitat for tadpoles, or the dam could create a barrier so tadpoles can't move downstream. Other risks to Coastal Tailed Frogs are forestry and land development. The adult frogs depend on moist habitats to survive, and because many of their streams are non-fish bearing, there is much less protection for these streams.

I release all the tadpoles in the bucket, having finished measuring them. I watch the male frog glance warily at me, ready to escape into the moving water in an instant if needed. Despite all the threats, these amazing frogs have persisted in the trying conditions of cool mountain streams. And if these individuals are lucky, they'll survive the hydropower project and forest harvesting, and live to be 20 years old - a good life for these amazing frogs!

Danielle Courcelles, M. Sc., R. P. Bio.
Aquatic Biologist, Fish and Aquatic Wildlife Resources
Ministry of Forests, Lands, Natural Resource Operations and Rural Development

#8 Waterway series, and Chipmunk Creek paintings by **Gary Haggquist**, Cultus Lake
https://www.garyhaggquist.com

Coastal Tailed Frog photo courtesy **Mike Stefiuk**

The Spawning Grounds

water carries the sun shadows circles where the earth
rises dark fern and Oregon grape

lake gulls grey wings between the earth and sky.
her feet bare burrow into the sand a fallen leaf in her hands
whispers of the seasons passed.

The air is berries too long on the vine and cedar
cedar douglas fir ponderosa pine the earth's heart beats within them

her boy at the water's edge his legs yet summer brown carry him
infant steps so quick then slow a stone held in his fingers the early sun against
his skin

'fish' he says the stone is flat and round pale the moon

'stone' she gives him the word fish she points to the water
the salmon a pair in the shallows

fish he quick marches in place fish fish fish a rhythm

the river is flecked red sockeye and shadow

in the shallows agate and quartz silt the water flows silent
a broken promise lost they are lost the salmon

she traces a finger through the sand and gravel the rivers they've travelled the fish
once these waters ran crimson with salmon returned

she thinks of bear where the brush grows thick in hidden places
bear wait for the fish to feed their winter sleep

salmon orca bear eagle she listens for their stories
but hears only echoes

the boy comes to rest on the earth with her he is warm and soft his eyes
as bright as stars

a raven calls from the Douglas Fir an eagle throws its shadow
the salmon begin and end

Angela Zimmerling, Abbotsford

Chinook Transforming Painting by **Leanne Hodges**
www.facebook.com/wildartist.leanne

Did you know?

Healthy streams are essential for riparian ecosystems. Whether they are large or small and fish bearing or not, streams contribute nutrients and fresh water to downstream fish and wildlife habitat.

Streams with treed setbacks in urban neighbourhoods provide significant cooling of the surrounding area, countering the urban heat island effect by as much as 17%.

Coho Salmon prefer the smallest streams and ponds, and their juveniles may even reside in roadside ditches. Destruction of beaver dams and trapping of beavers is commonly practiced by both municipal and provincial governments despite impacts to Coho habitat.

Smaller stream setbacks increase the likelihood of habitat degradation and contamination of the watercourse while wider setbacks can support local biodiversity of both plants and animals including at-risk species.

Despite their importance, stream setbacks based on Riparian Area Regulation assessments conducted by developers, use stream size and fish presence to determine setback size. In some cases, stream setbacks can be reduced to 2meters or even less.

The impacts of cumulative loss of small streams on fish and wildlife habitat is rarely considered in development planning processes, which tend to focus on drainage and storm water management issues over species preservation or ecological integrity.

Over 71% of streams in the Lower Fraser valley are considered endangered or threatened, most of which are small streams, and 15% of streams in the area no longer exist.

Photo of residential development in progress by Chester & Mackie Creeks, Nelson St., Mission (Silverdale area).

Ancestor Egg by **Ronnie Dean Harris**,
Stō:lo/St'át'imc/Nlaka'pamux

THE FOOTPRINT PRESS

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