

THE PACIFIC SALMON FOUNDATION MAGAZINE

# SALMON Steward

**CENTRAL COAST - SALMON IN CRISIS** 

First Nations efforts to conserve and recover salmon

KUS-KUS-SUM ON THE ISLAND

Habitat reborn from former sawmill site

HATCHERY EFFECTIVENESS Multi-year project reviews B.C.'s hatcheries

# SALMON Steward

SUMMER/FALL 2022



#### ABOUT US

We're salmon first, salmon always. Our vision is healthy, sustainable, and naturally diverse populations of Pacific salmon for the benefit of ecosystems and Canadians for generations to come.

#### EDITOR

ErinRose Handy

CONTRIBUTING WRITERS Braela Kwan

ErinRose Handy Margaret Buttner

**DESIGN** Carmen Bright



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#### CONTACT US

300 – 1682 West 7<sup>th</sup> Avenue Vancouver, B.C. Canada V6J 4S6 T: 604.664.7664 | F: 604.664.7665 salmon@psf.ca | psf.ca

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From left: Michael Meneer with Hon. Josie Osborne, B.C. Minister of Land, Water and Resource Stewardship, and Bob D'Eith, MLA of Maple Ridge-Mission touring the Heart of the Fraser River. They stopped at the Matsqui Fish Wheel in Misson, where a team tagged Chinook salmon as part of a migration impediment research project supported by the B.C. Salmon Restoration and Innovation Fund (see p. 12).

**W**<sup>e</sup> have reached a historic point where many Pacific salmon stocks are threatened or endangered.

Current salmon management and conservation efforts are fragmented and complex due to overlapping and conflicting jurisdictions and authorities. This is compounded by the complex life-cycles and migration patterns of Pacific salmon.

We need a new model and plan to rebuild Pacific salmon. One that breaks down silos between federal, provincial, and Indigenous governments. In early 2022, PSF and the First Nations Fisheries Council (FNFC) of B.C. formed a partnership, creating the Pacific Salmon Action Dialogue Series to convene people who share this belief and a desire to come together for our salmon.

The Pacific Salmon Action Dialogue Series is focused on the key notion that salmon are in crisis, and it's going to take all of us to find a solution. By partnering as joint conveners in the salmon community, we've hosted four Dialogues, engaging a diverse coalition of leaders including First Nations, federal and provincial governments, and non-governmental conservation organizations.

Through these initial Dialogues, there is unwavering support for the notion that we need a collaborative framework to drive action for salmon rebuilding and protection, and it is imperative that First Nations be in a leadership role in salmon restoration. As the Dialogues build momentum and a space for collective sharing, we are working with FNFC on the outline of a collaborative framework, learning from successful models operating in B.C. and other jurisdictions, and with continuous input from Dialogue participants. We hope to garner more support from First Nations communities and organizations, government, NGOS, industry, and others.

• Through these initial Dialogues, there is unwavering support for the notion that we need a collaborative framework to drive action for salmon rebuilding and protection, and it is imperative that First Nations be in a leadership role in salmon restoration.

I want to personally thank our partners: Jordan Point, Executive Director of the First Nations Fisheries Council of BC and team, our Steering Committee, and all participants, as well as the Sitka Foundation for their generous support.

It's salmon first, salmon always, and we don't go it alone.

Mill I. Men-

Michael Meneer President & CEO, Pacific Salmon Foundation

#### ON THE COVER:

Kitasoo/Xai'xais research technicians sampling sockeye salmon using a small hand seine net (see p. 4).

Photo (top): Tavish Campbell

#### COMMUNITY CORNER



#### ART CONTEST FOR KIDS

We're on the lookout for talented young artists! Winning salmon-inspired art submissions receive a \$100-value prize pack. Classroom entries can win up to \$500 for approved salmon programs. *Details here:* **psf.ca/kids-art** 



#### SALUTE TO THE SOCKEYE FESTIVAL

Join PSF in supporting the **Salute to the Sockeye Festival** at the **Adams River**, Sept. 30 to Oct. 23. Don't miss the artisan gallery, food, interactive touchscreen activities, interpretive walks, salmon life-cycle storyboards; and souvenir market. *For details: salmonsociety.com* 

#### PSF POST-SECONDARY BURSARY

Are you in a college or university program related to the conservation and restoration of Pacific salmon? Apply now to the **Stewardship Community Bursaries** open to full-time students in B.C. and the Yukon pursuing a career supporting Pacific salmon. Applications close Oct. 30, 2022. For details visit: **psf.ca/bursary** 

#### **BOARD UPDATES**

PSF sincerely thanks its **Board of Directors** for their service and leadership. Retiring in 2022, we thank **Ward Bond, Anson Frost**, and **Paul Sprout**. Thank you to our current Board **Russell Ball, Ross Beaty, Susan Farlinger, Brenda Gaertner, Jeff Geisbrecht** (Chair), **Pamela Goldsmith-Jones, George Iwama, Peter Lister, Murray Ned, Kevin Nugent** (Past Chair), **Cam Proctor, Jason Quigley, Gord Sterritt,** and **Shauna Towriss** for their ongoing service.

#### SALMON SPOTTING

Looking to get outside and view one of nature's wonders? Look no further — salmon are back! PSF has launched a #SalmonSpotting map to help you find the best spots in B.C. to see salmon's awesome migration. *Learn more at:* **psf.ca/salmonspotting** 

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## **CENTRAL COAST - SALMON IN CRISIS**

## Jennifer Walkus has been concerned about the collapse of salmon on the Central Coast of B.C. since the 1970s.

Both her father and grandfather worked in salmon management. Her father was the fisheries manager for Wuikinuxv Nation and her grandfather was a creekwalker employed to count salmon with Fisheries and Oceans Canada (DFO). As a child, Walkus closely shadowed her father and quickly picked up his interest in resource management. Like her grandfather, her father often led creek walks in their territory. By the '70s, he noted alarming salmon declines.

Walkus herself embarked on a career to protect salmon, starting as a fisheries assistant for the Wuikinuxv Nation in the 1990s, then later taking on roles as fisheries manager and stewardship director. Now, as an elected councillor for Wuikinuxv Nation, she laments the declining state of salmon.

"We're losing out on a lot of our culture because we don't have the salmon populations to support our needs anymore," says Walkus.

The Walkus family is from Wuikinuxv Nation, a community that has relied on millions of salmon returning to the rivers and streams in their territories for millennia. As with many Indigenous communities in B.C., Wuikinuxv culture and survival are connected to salmon — a resource that has provided food security and economic stability for the community.

Dramatic declines in salmon populations in recent decades have changed everything. The abundance of salmon returning to Wuikinuxv territory is only a fraction of what it once was. Owikeno Lake sockeye, for instance, historically recorded annual returns in the range of two to six million fish. Today, the returns have plummeted to 200,000. Populations have declined so drastically that in four of the last five years, the Nation has closed its own sockeye food fishery, which was once one of the most impressive runs on the coast. "We take the health of our ecosystem seriously," says Walkus.

The Wuikinuxv's salmon circumstances resemble trends occurring across the entire Central Coast of B.C. The traditional territories of the Heiltsuk, Kitasoo Xai'xais, Nuxalk, and Wuikinuxv First Nations cover more than 55,000 kilometres of terrestrial and marine ecosystems on the Central Coast, including some of the province's most intact and productive salmon habitats.

Abundant wild salmon on the Central Coast have been essential to the culture and prosperity of First Nations for more than 10,000 years. Today, most salmon populations are not what they used to be.



Photo: Tavish Campbell

In recent years, climate change, overfishing, and habitat destruction have transformed conditions for salmon, leading to the collapse of a once-thriving salmon ecosystem. Salmon returns to the Central Coast have reached historic lows. Furthermore, due to data deficiencies as a result of reductions in monitoring efforts over the past decade, the full extent of salmon declines remains unknown.

Since 2016, PSF's Salmon Watersheds Program has worked with Central Coast First Nations and the Central Coast Indigenous Resource Alliance (CCIRA) to improve access to baseline data and



There are 114 groups of genetically distinct wild salmon populations that spawn on B.C.'s Central coast. These salmon represent nearly one quarter of all salmon populations in B.C. and reflect the incredible biodiversity in this remote region of the province.

develop tools to assess the state of Pacific salmon and their habitats in the region.

This work has involved numerous steps, including:

- Data compilation and salmon status assessments
- Characterizing major threats to salmon and prioritizing strategies for supporting their persistence
- Developing an Indigenous-led salmon monitoring and stewardship framework
- Strengthening Indigenous-led escapement monitoring efforts



#### STATUS ASSESSMENTS CONFIRM LOW RETURNS

The collaboration began with developing a publicly available baseline of information on the status of salmon and their habitats. Much of the data that had been collected for Central Coast salmon were scattered in a number of different databases and were difficult to access. PSF's Salmon Watersheds Program worked with local salmon experts to identify the best available data sets and bring them together in a centralized database. This data were used to undertake assessments of the current state of salmon and their freshwater habitats and made available in the Pacific Salmon Explorer (www.salmonexplorer.ca), an online data visualization tool for B.C. salmon developed by PSF.

These analyses have shown that many Central Coast sockeye runs have declined by more than 74 per cent since 2005 with chum down 43 per cent.

But the data aren't perfect.

Recent efforts to assess the status of salmon and their habitats in the region have revealed major data gaps, due in part to declines in funding to support monitoring efforts over the past decade. In fact, the biological status of more than 50 per cent of all salmon on the Central Coast could not be assessed due to a lack of baseline salmon stock assessment data. Since 2006, the number of routinely monitored spawning streams on B.C.'s North and Central Coast has declined by half creating more unknowns regarding the state of salmon in the region.

Despite the gaps in data, community members have observed significant changes in local salmon populations for many years.

"We're seeing real climate change impacts in front of our eyes. It hits home really hard," says Vernon Brown, outdoors coordinator and field technician for the Kitasoo Xai'xais Stewardship Authority. "Last year was a scary year with low coho numbers. It wasn't the first time we've seen numbers that low, but it was kind of an awakening for the coast." Brown, who has been doing creek walks for eight years and previously worked in eco-tourism, says he's been growing an understanding of how salmon are faring.

"This collaborative work gets us closer to being proactive rather than reactive in our fisheries management," he says. "Salmon data collection and quality is super important to my community. We can use that and make on-the-fly fisheries decisions to protect what's left."

#### 200+ CONSERVATION RECOMMENDATIONS

The initial data synthesis and status assessments indicate there are opportunities for greater coordination, standardization, and investments in salmon monitoring.

More recently, several Central Coast First Nations, PSF, and CCIRA teamed up with DFO and regional salmon experts to develop and work towards implementing a regional Salmon Monitoring and Stewardship Framework for the Central Coast (the Monitoring Framework). The Monitoring Framework identifies shared goals for salmon conservation and



Photos: Leah Honka



management, and prioritizes strategies and actions for collaboratively working towards these goals.

"Central Coast First Nations are working to develop capacity to manage their marine resources informed by work such as the Monitoring Framework," says Rich Chapple, president of CCIRA. "This framework will serve as a structured guide for strengthening the scientific foundations for fisheries governance approaches that support conservation and recovery efforts for wild Pacific salmon and the communities who depend upon them."

More than 200 actions have been identified for helping to realize these goals. One of these actions calls for improvements in salmon escapement monitoring and expanding upon the kind of creek walks that Walkus' father and grandfather led years ago.

> Escapement refers to the amount of salmon that escape fisheries and return to their freshwater spawning habitats.

CC This collaborative work gets us closer to being proactive rather than reactive in our fisheries management," Vernon Brown says. "Salmon data collection and quality is super important to my community. We can use that and make on-the-fly fisheries decisions to protect what's left. )

#### **IMPROVING MONITORING EFFORTS**

Today, much monitoring effort is focused on "indicator streams," which provide a good indication of the state of salmon populations within a given area. While these streams are important to monitor, they are not inclusive of all salmon streams that are valuable to the Central Coast First Nations for example, streams that support food fisheries and tourism.

To address this, the project collaborators worked to identify priority streams for escapement monitoring as identified by each of the Central Coast First Nations. This included developing an online interactive Escapement Monitoring Tool for visualizing these priority streams and ultimately supporting the Nations in planning their escapement monitoring activities in their territories.

"The Central Coast Escapement Tool redefines how monitoring priorities are identified. Instead of focusing our efforts on monitoring salmon populations that are important to commercial fisheries, we worked with the Central Coast Nations to identify those populations that are central to their cultures, economies, and food security to ensure that monitoring efforts are directed to populations of local importance," says Dr. Katrina Connors, Director of PSF's Salmon Watersheds Program.



Photos: Julian Heavyside



The development of the Salmon Monitoring and Stewardship Framework and support for advancing its implementation has been provided by The Pew Charitable Trusts. CCIRA and the Central Coast Nations have also secured grants from the B.C. Salmon Restoration and Innovation Fund to support the implementation of the Monitoring Framework including developing a recreational catch monitoring program and identifying priority watersheds and implementing activities aimed at restoring wild salmon. Over the next two years, Central Coast Nations will be investing in Indigenous-led restoration efforts further helping to improve community capacity for salmon monitoring and stewardship.

"This project exemplifies how collaborative conservation planning can support community empowerment and the fulfillment of local objectives focused on sustaining the resilience of wild Pacific salmon," says Dr. Connors.

## PERCY WALKUS HATCHERY UPDATE

At the Percy Walkus Hatchery, People for Salmon work to help Chinook rebound. The hatchery, a unique model to conserve, restore, and enhance special salmon stocks in Rivers Inlet, B.C., is run by the Wuikinuxv Nation on the Central Coast in partnership with local fishing lodges, PSF, and DFO.

The hatchery employs advanced genetic tools and parental-based tagging, which makes it possible to trace the parents of every hatchery fish that returns, and this along with data obtained using more traditional coded-wire tags indicate that enhancement efforts are working. Egg-to-fry survival in 2021 was higher than 90 per cent with more than 295,000 Chinook fry released.

Ted Walkus, Hereditary Chief of Wuikinuxv First Nation and nephew of Percy Walkus (whom the hatchery is named), carries the torch to conserve salmon.

"I think this should be a model for other nations to look at, to partner with local lodges and interested groups that want to do something to help salmon," says Walkus. "Our hatchery is privately funded with 99 per cent of the money coming from sport fishermen putting back into a resource that they're extracting from. Accolades to the Wuikinuxv Nation for accepting and being part of a successful story."

With 100 per cent of the proceeds supporting hatchery operational costs, the annual Duncanby Lodge fundraiser held in June of 2022 set a record bringing in \$600,000.

A special thanks goes to those who support the Percy Walkus Hatchery including Duncanby Fishing Lodge, Good Hope Cannery, Bridgeview Marine, and other generous individuals.

Walkus also notes that part of the success story is what the hatchery means to his community of 60 people. "When we can hire two or three in our community — it makes a difference to people as well as fish."



# hoto: John Christie

## DO YOU HAVE THE WILL TO HELP SALMON IN THE FUTURE?

One of the most important documents that many people will sign in their life is their will. <u>Yet, just over 50 per cent of Canadians have</u> documented their estate plans.

These include ensuring their loved ones including minor or adult children — are cared for, real estate and other assets are distributed according to their wishes, and steps have been taken to minimize taxes owing upon their passing.

The Pacific Salmon Foundation is honoured to know that supporters are planning forward and including a gift to PSF in their wills.

Jeff Giesbrecht, Chair of PSF's Board of Directors, and Rosann Youck are two such donors.

"We believe in the Pacific Salmon Foundation's vision because we've seen the results. Marine habitat has improved through the work of local stream keeping groups and the research conducted by PSF's science teams. Our goal is to help the foundation continue its efforts to protect and restore wild Pacific salmon now and in the future." Whether cash, stocks or bonds, registered plans, life insurance or other financial instruments, gifts of all sizes make an impact. Over time, these donations serve to protect and enhance Pacific salmon.

PSF is a partner in Will Power, a national public education program designed to inspire more Canadians to make a significant impact on the causes they care about by making a gift in their will to charity. Visit www.willpower.ca to access valuable information including a legacy calculator.

"We all want to help those around us and leave the world a better place. Leaving a charitable gift in your will is a special way to make your mark," says Margaret Buttner, Manager, Development, PSF.

To learn more about leaving a gift in your will, contact Margaret for more information: 604-664-7664 or mbuttner@psf.ca



#### 2022 VANCOUVER GALA BACK WITH A SPLASH

#### Funds raised support a healthier future for salmon

Pacific Salmon Foundation's 2022 Vancouver Gala Dinner & Auction — presented by Wheaton Precious Metals — raised \$500,000 to advance the essential restoration and conservation work of People for Salmon.

The 30<sup>th</sup> anniversary of the flagship fundraiser was a huge success thanks to the support of many key leadership sponsors and all who contributed to the event.

Photo: Ron Sombilon



Photo: Jim Shinkewski

# CHAMPIONING CHANGE FOR HABITAT RESTORATION

Constructed in the 1970s for an intended coal port that never developed, the Squamish Spit has long been a barrier for juvenile salmon. The spit blocks young salmon from accessing the Howe Sound estuary, which provides an opportunity to grow bigger and stronger before the fish venture out to sea.

As a result of more than 20 years work and a partnership of the Squamish River Watershed Society, Fisheries and Oceans Canada (DFO), Squamish Nation, and the local environmental community, the berm is being removed with the goal of restoring Chinook salmon habitat to pre-spit conditions. The Squamish Spit Removal project receives funding from PSF's Community Salmon Program (CSP).

"The removal of the lower stretch of the Squamish Spit will open up the estuary to outmigrating juvenile Chinook salmon that will be able to enter the rich waters of the estuary to grow into smolts before entering into Howe Sound," says Edith Tobe, project manager for Squamish River Watershed Society. "The project is expected to improve juvenile Chinook salmon survival by 10,000 to 100,000 annually."

Meanwhile, in Port Alberni, the Riparian Restoration in Huu-ay-aht Territory project also receives funding from CSP. The Huu-ay-aht First Nations team is planting Western Red Cedar and Sitka Spruce in select areas of South Sarita, Pachena, and Sabrina creeks. The trees' roots will stabilize the banks and provide woody debris that serves to enhance fish habitat. Funded primarily from sales of the federal government's Salmon Conservation Stamp purchased annually by saltwater anglers, PSF's Community Salmon Program provides grants for salmon conservation projects. Proceeds from the \$6.24 stamp are returned to British Columbia through PSF, generating nearly \$1.5 million annually for community grants. Through 2023, the Province of British Columbia also committed funds to CSP as part of a \$5 million grant. The current CSP grant application period is open until Oct. 15, 2022.

#### THANKS TO OUR DONORS!

Thanks to a \$50,000 donation from Paper Excellence, which will support salmon conservation projects near the company's B.C. operations – Cranbrook, Crofton, Howe Sound, and Port Alberni, PSF is able to support significant habitat projects.

## FORMER SAWMILL TRANSFORMS INTO PRISTINE SALMON HABITAT

COMOX VALLEY'S KUS-KUS-SUM GIVES SALMON A FIGHTING CHANCE

Kus-kus-sum is a former industrial sawmill site in the heart of a salmon migratory corridor of the K'ómoks Estuary. Located at the mouth of a critical estuary, the site was once a tidally influenced forested wetland and riparian area prior to its development. It is a historical site for the K'ómoks First Nation.

After operating intermittently for nearly six decades, the sawmill closed its doors in 2006. The company demolished the mill and completed the required remediation works, yet the industrial footprint lingers. Most notably, a 400-metre-long steel piling wall stands in the Courtenay River.

Since 2020, PSF has contributed \$38,850 to Kus-kus-sum through the Community Salmon Program. With support from PSF, the partnership of K'ómoks First Nation, Project Watershed, and the City of Courtenay is restoring Kus-kus-sum to a vibrant and productive ecosystem by removing industrial infrastructure, reintroducing tidal habitat elements, and planting native vegetation. Juvenile Chinook salmon use the K'ómoks Estuary extensively for rearing, foraging, and refuge during their migration from freshwater to the ocean. Once the restoration work is complete, the site will create 8.3 acres of habitat for fish and wildlife, advance local climate action, and restore a sacred ecosystem to its traditional stewards.

"I feel strongly that Kus-kus-sum will connect our next generations to our land," says Krissy Brown, the assistant manager of the K'ómoks Guardian Watchmen Program. "Hopefully they can find more positive ways to continue building the natural state of our land and our waters."

Chinook, coho, pink, and chum salmon rely on the K'ómoks Estuary. Currently, seals and sea lions utilize the steel piling wall as an opportunistic feeding platform to easily hunt migrating salmon. The restoration work will remove the steel piling wall, effectively reducing predation pressures on both out-migrating juveniles and returning adult spawners.



Photo: Allison Colina

### **PROJECT POINTS:**

- Creating 8.3 acres of fish and wildlife habitat
- Supporting 145 bird, 218 plant, and 29 fish species
- Planting 30,000 native plants
- Removing 12,000 m3 of concrete





The steel piling wall separating the Courtenay River from the Kus-kus-sum site will be removed.

Photo: Norm Prince Brokenfish

Kus-kus-sum construction site progress.

Photo: Braela Kwan

change, as it will limit flooding risks, reduce coastal storm surge, and combat sea-level rise.

Photo: Alanna D Photography

"We've had catastrophic flooding several times in the last 15 years. We expect that to continue," says Doug Hillian, City of Courtenay councillor. "This work will restore the natural condition of the river so that it functions as a natural asset to buffer against the effects of climate change."

Site work kicked off in 2021 with the removal of 12,000 cubic metres of concrete and preliminary plantings. The priorities for 2022 and moving forward include: adjusting the elevation to a natural level where plants can thrive, creating habitat complexity, and continued plantings of species such as Sitka spruce, alder, hemlock, sedge, and willow, among others. The restoration work is expected to finish in 2024, after which K'ómoks First Nation and the City of Courtenay will be joint owners of the site.

Eventually, full ownership and management of the site will be transferred to K'ómoks First Nation, who will conserve and steward the site in perpetuity. "We look forward to monitoring and stewarding the area once it's back within the K'ómoks First Nation name," says Brown.

Additionally, the project will improve salmon habitat quality.

"We are reintroducing natural habitat elements, such as tidal marsh islands and channels, and planting native vegetation to improve habitat quality and restore some of the habitat complexity that allowed biodiversity to thrive here before the site was developed," says Caitlin Pierzchalski, executive director of Project Watershed.

Salmon won't be the only wildlife to benefit from the restoration of Kus-kus-sum. More than 145 bird, 218 plant, and 29 fish species, as well as many intertidal animals call the K'ómoks Estuary home. All will be able to utilize the improved habitat.

In addition to improved conditions for local biodiversity, Kus-kus-sum will enhance local resiliency to climate change. The project will store carbon to combat greenhouse gas emissions by planting vegetation species with high carbon-sequestration capacities, such as Sitka spruce. Additionally, the restoration will also help the community adapt to climate

Kus-kus-sum roughly translates to: really slippery on the beach. K'ómoks First Nation named the site Kuskus-sum in recognition of a historic village site that was located in the vicinity. "It really illustrates how long our people have been around and how long they've been in relationship with the land," says Weidlidi Speck, who is of K'ómoks, Kwakwaka'wakw, and Nuu-chah-nulth background.

# INVESTIGATING HATCHERY EFFECTIVENESS

Hatcheries were first built on the West Coast in Canada and the U.S. in the late 19<sup>th</sup> century. Salmon runs were already declining.

Today, hundreds of hatcheries pepper the Pacific Northwest's coasts and rivers. In British Columbia, hatcheries release approximately 300 million juvenile Pacific salmon annually to help enhance salmon populations and conserve species at risk.

While hatcheries can support healthy salmon populations, they can also lead to consequences for wild salmon, including effects on their genetics, overharvesting of those that travel alongside hatchery fish, and competition for food and habitat.

As hatcheries strive to rebuild and conserve Pacific salmon, how effective are they?

To begin answering that question, PSF launched the Hatchery Effectiveness Review in 2019. The program not only evaluates effectiveness, but also aims to identify consistent methods to improve survival rates.

While PSF's report provides hatcheryspecific information for managers to consider when planning releases in the future and identifies locations with the greatest opportunities for improvement, each hatchery is unique, and what works best at one facility may not work at another. The study team has completed the first comprehensive review of hatchery release strategies in B.C. The study considered all releases and recoveries of coded wire tagged Chinook and coho in the province since 1972, as well as specific release experiments run by DFO's Salmonid Enhancement Program over the last 20 years.

The results reveal room for improvement in release strategies to help maximize survival.

For example, the size-at-release and time-of-release can make a difference. While results vary, generally speaking, releasing fish at larger sizes and releasing Chinook earlier and coho later than historically done will likely result in higher survival rates.

"Both hatchery and wild salmon survival depend on the conditions they face as juveniles, so release strategies, such as the timing and size of the fish, matter," says PSF biologist Sam James, who lead the release strategy study.

"However, there is no one-size-fits-all solution. Given that salmon populations in B.C. differ in genetics, habitats, and environmental exposures, salmon enhancement strategies need an equally diversified approach."



Raising young Pacific salmon in hatcheries for life in the wild is complex. There are more than 9,000 distinct populations of Pacific salmon in B.C., each carrying unique genetics and life histories. Coupled with differences in hatchery operations and conditions, there is no all-encompassing solution. While PSF's report provides hatchery-specific information for managers to consider when planning releases in the future and identifies locations with the greatest opportunities for improvement, each hatchery is unique, and what works best at one facility may not work at another.

Additionally, environmental conditions are changing, so how hatchery salmon are reared and released needs to be adaptive. This will require long-term experiments, consistent data collection and analysis, and increased monitoring in areas lacking quality data.

PSF's Hatchery Effectiveness Review aims to support hatchery managers as they navigate the complex relationships between release strategies and optimal salmon survival. The project's next phase, currently underway, examines the interactions between wild and hatchery fish.

This review was funded by the B.C. Salmon Restoration and Innovation Fund. Learn more at: psf.ca/hatchery-release



Photo: Amy Romer

### RESEARCH UNCOVERS EVIDENCE OF DISEASE IMPACTS FROM OPEN-NET SALMON FARMS

SALMON HEALTH PROGRAM POISED FOR FURTHER ADVANCES THANKS TO **NORTH FAMILY FOUNDATION** GIFT

#### Two recent peer-reviewed papers out of PSF's Salmon Health Program (successor to the Strategic Salmon Health Initiative) help shed light on the impact disease may have on wild salmon in B.C.

Dr. Andrew Bateman, Manager of the Salmon Health program, led a study indicating that levels of a bacterial pathogen, *Tenacibaculum maritimum*, were much higher near salmon farms. The research indicates that Fraser sockeye were much more likely to harbour the ulcer-causing pathogen when swimming past Discovery Island salmon farms than at other points along their migratory route. Data from the study do not cover 2020, when many of this year's returning Fraser River sockeye went to sea.

"This year's sockeye returns show how complex salmon recovery can be across different populations and watersheds. We're seeing promising returns to the Skeena, but lower than forecast returns to the Fraser," adds Dr. Bateman. "Importantly, in our work, one year does not make a trend. We will continue to monitor how recent farm removals from the Discovery Islands — and other factors — may affect these important fish." A second study, drawing on the Strategic Salmon Health Initiative's data, led by UBC's Dr. Art Bass, assessed dozens of pathogens in thousands of Chinook and coho salmon sampled over a decade along the B.C. coast. The study identifies — for the first time ever — the two pathogens most closely linked to the mortality of free-ranging Pacific salmon in the ocean: *Tenacibaculum maritimum* and *Piscine orthoreovirus* (PRV), a virus that causes disease in Pacific and Atlantic salmon worldwide.

"This is the first empirical evidence that PRV is negatively impacting wild Pacific salmon in B.C.," says Dr. Bass, a postdoctoral researcher at UBC's Pacific Salmon Ecology Conservation Lab. "These two pathogens are common on salmon farms in B.C., and recent studies provide evidence of transmission from farms to wild salmon."

"These two peer-reviewed publications help to clarify the disease risks that multiple species of Pacific salmon face," says Dr. Bateman. "As many PSF's Salmon Health Program received a vital boost thanks to a \$450,000 donation from the North Family Foundation led by long-time salmon advocates Rudy and Patricia North. The donation will advance critical research into the cumulative ecological stressors facing salmon at a time when half of B.C.'s wild populations are in decline.

"Through my lifetime, I've been a passionate advocate for our marine ecosystems and salmon research and recovery efforts. My hope is that this donation, together with the support of others in our community, will advance the research required to galvanize action to stop the dramatic decline in salmon populations that we have all witnessed in recent decades," says Rudy North.

The donation will advance:

- Research on Cumulative Environmental Stressors: Researchers use genetic FitChip technology to understand the combined impact of changing environmental conditions on the health of Pacific salmon in relation to long-term survival. Their findings drive action to mitigate specific stressors under human control.
- Independent Research + Monitoring of Aquaculture: Research related to pathogen transfer to help support the federal government's 2025 commitment to transition away from open-net salmon farming.

Your tax-deductible contribution can aid this ongoing work to mitigate risks to B.C.'s wild salmon, as well as development of sciencebased solutions to rebuild salmon populations.

#### THE HEALTH OF WILD PACIFIC SALMON DEPENDS ON US. DONATE TODAY: PSF.CA/SALMONHEALTH

wild salmon populations in B.C. have experienced substantial declines over the last three decades, our work suggests that precautionary steps to manage risks under human control — like salmon farms — could play an important role in ensuring a bright future for wild salmon."

Both peer reviewed studies were funded by the Pacific Salmon Foundation, Genome BC, and DFO.



## CANADA'S NEXT STEPS IN TRANSITIONING AWAY FROM OPEN-NET PEN SALMON FARMING

As the vast majority of B.C. salmon farm licenses were set to expire in June, the Government of Canada issued an update on their mandate to transition away from open-net pen salmon aquaculture in the province. The update outlines work anticipated to develop the draft framework for transitioning by 2025. The consultation period closes in early 2023.

PSF is actively participating in and contributing to early phases of transition consultations with the Hon. Joyce Murray and DFO.



Photo: Rob Sombilon

# FISH WHEELS ALLOW TRACKING IN THE FRASER RIVER

TAGGING FRASER CHINOOK TO IDENTIFY SALMON MIGRATION DISRUPTIONS

Fraser River Chinook salmon have experienced declines for many years. As a result, at least 15 of the 17 wild populations of Fraser Chinook are considered at risk. Still, their migration has not been well studied because their return to the Lower Fraser occurs during the spring thaw, or freshet, a challenging time to study fish. A partnership between the PSF, Matsqui First Nation, Yale First Nation, and DFO is tagging adult Chinook salmon and tracking their migration to identify potential locations where the fish face impediments as they journey to their spawning grounds.

"One of the very first laws we have as First Nations is protecting resources for the next seven generations to come. By doing this tagging work, I hope it will help protect salmon stocks," says Brenda Morgan, Matsqui First Nation councillor and fisheries representative. Morgan, worried about the effects of climate change and pollution on wild salmon, is keen to advance efforts to conserve salmon and protect habitat in the Lower Fraser.

"My grandmother and my mother used to fish from Thursday through Sunday. No problem. Never did you hear any of this talk of limited numbers," she says. "Now, we're down to hours in the season, so there's big writingon-the-wall that we're doing something wrong, and we need to fix it."

High flow conditions in the Fraser, expected to become more common as climate change increases extreme weather events and alters snowmelt timing, pose migration difficulties for salmon. When flows are high, salmon require more time and energy to reach their spawning grounds, influencing their survival. For example, high flows in 2020 led to Fraser salmon not showing up to Big Bar, a section of the Fraser 64 kilometres north of Lillooet, for the first four to six weeks of their migration, indicating that flow conditions in the lower parts of the Fraser Canyon were holding them up.

"Given the increasing evidence of climate effects across B.C., we need to study salmon behaviours in the migration corridors of the Fraser," says Jason Hwang, PSF's VP of Salmon. "Intending to assess potential migration disruptions, we hope to identify areas where it may be possible to improve migration conditions, making the journey easier for salmon and improving survival outcomes."

Large rotating, water-powered fish wheels in the Lower Fraser enable salmon to be caught, radio tagged, and released and tracked.

During the peak tagging season, a team of five operates the Matsqui fish wheel every day, including two staff from LGL Limited, an environmental and research consulting firm, and three technicians from Matsqui First Nation. The crew ensures all equipment is in working order and maintains the fish wheel's zero-per-cent mortality rate throughout its use.

In the first year of the project, 98 adult Chinook were successfully tagged. Early results show that many of the tagged salmon stayed within the Lower Fraser for a substantial amount of time, some more than 40 days.



Photos: Rob Sombilon

Now in the second year, the project team continues to tag, track, and monitor the progress of salmon throughout the summer and fall as they return to their rivers and streams throughout the Fraser.

DFO is also tagging and tracking salmon in the Fraser to assess sockeye migration. Combined, PSF and DFO's tagging projects provide in-depth tracking coverage for salmon in the key migration corridors in the Fraser.

This project is part of PSF's Climate Adaptation Program launched in 2021 and supported by the B.C. Salmon Restoration and Innovation Fund.



#### AMERICAN SHAD

During the first year of the project, an unexpected number of American shad were captured at the fish wheel, but little is known about these anadromous fish in the Fraser. American shad, introduced to the West Coast from the Atlantic Ocean in the 19<sup>th</sup> century, have proliferated in some Pacific systems.

This year, PSF purchased additional tags to track up to 100 American shad to assess their migration and how they are using the Fraser River. PACIFIC SALMON FOUNDATION

# EXPERIENCE ONE OF NATURE'S WONDERS!

Throughout the fall, millions of Pacific salmon return from the ocean and migrate to their birth streams to spawn.

PSF's **#SalmonSpotting map** highlights the best spots in B.C. to see them.

## SALUTE TO THE SOCKEYE FESTIVAL

Journey to the Adams River for one of the world's most famed salmon migrations.

Every four years the sockeye return to the Adams River in incredible numbers. Don't miss the 2022 migration.

PSF is a proud sponsor of the Salute to the Sockeye Festival Sept. 30 to Oct. 23, 2022 8:30 am – 4:30 pm at Tsútswecw Provincial Park (Northeast of Kamloops)

## FIND A LOCATION NEAR YOU: PSF.CA/ SALMONSPOTTING



Photo: A.S. Wright