



THE PACIFIC SALMON FOUNDATION MAGAZINE

SALMON STEWARD

WINTER 2023 | PSF.CA



SAVING STRANDED SALMON

Rapid response helps salmon reach
their spawning grounds

HATCHERY EFFECTIVENESS

The first comprehensive review of
B.C. hatcheries since the 1990s

A BIRD'S EYE VIEW

Using drones to map natural
cooling zones for salmon

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WINTER 2023



PACIFIC SALMON
FOUNDATION

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.

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CEO'S MESSAGE

Salmon face many intense challenges — climate change being the greatest.

Many factors are out of our control, such as ocean acidification and warming waters, but the Pacific Salmon Foundation (PSF) is intervening in the areas where we can have a positive influence on salmon.

Thanks to our supporters, PSF is bringing on new staff and launching new partnerships to pull levers for change that make a difference for salmon and their habitats.

Climate adaptation is a high-impact lever of change for PSF.

Extreme climate events are not anomalies. They are increasing in intensity and frequency, and we need to anticipate climate impacts on salmon and take action to help them adapt.

This year, PSF has been a leader in mobilizing funding and partners to coordinate rapid drought response projects (see more on page four). These projects have helped salmon across B.C. reach their spawning grounds and bolster future generations of salmon.

We thank our many partners – notably the Province of British Columbia, Fisheries and Oceans Canada (DFO), streamkeepers, and First Nations partners – for making rapid response drought efforts possible.

Another lever is PSF's position on the transition from open-net pen aquaculture in British Columbia. Based on independent science on the impacts of open-net pens on wild salmon, it is clear that these farms present undue risks to wild salmon. Therefore, PSF supports the decision to phase out open-net pens from B.C. waters by 2025, which the federal government has committed to previously.

Recently, I had the pleasure of meeting Hon. Diane Lebovitchillier, the new Minister of Fisheries, Oceans and the Canadian Coast Guard. Our conversation focused on what we can do to help salmon, re-iterating that open-net pens need to be removed, and recognizing the need for a fair and equitable economic transition plan for coastal and Indigenous communities.

This transition should include the economic and ecological benefits of investing in a wild salmon recovery economy. Washington State has operated under a dedicated salmon recovery strategy for the last two decades. There, a \$1 million investment in watershed restoration has been shown to create more than 30 new jobs and up to \$2.5 million in total economic activity.

Drawing inspiration from Washington, PSF is scoping what a new British Columbia salmon recovery strategy would look like in partnership with the First Nations Fisheries Council of B.C. and other experts (see more on page seven).

Michael Meneer
President & CEO,
Pacific Salmon Foundation

ON THE COVER:

Rapid response to help salmon adapt to drought and reach their spawning grounds (pg.4).

Photo (top): Brandon Deepwell

COMMUNITY CORNER



Beverley Kniffen at Irv Ridd's memorial service.

IN MEMORY OF IRV RIDD

PSF celebrates the life of Irv Ridd, a true visionary and co-founder of the Scholarship Foundation of the Pacific. Irv's profound commitment to supporting students from Haida Gwaii and passion for marine life has been a guiding light. Our heartfelt sympathies go out to his loved ones, especially his children and his wife, Beverley Kniffen. We will continue to be inspired by the enduring impact Irv has made.



PSF'S INAUGURAL VOLUNTEER DAY

On Nov. 6, PSF hosted its inaugural Volunteer Day at Lynn Creek in North Vancouver. Donors, streamkeepers, supporters, and staff came together to help plant native trees and restore the riparian habitat near Bridgeman Park. Thank you to our donors for their continued support of salmon recovery.



Left to right: Brian Riddell (PSF), Dan Nomura (Canfisco), Richard Beamish (DFO).

INTERNATIONAL YEAR OF THE SALMON AWARD

Congratulations to former PSF president Dr. Brian Riddell, and colleague Dr. Richard Beamish, for receiving the William E. Ricker Resource Conservation Award! Their International Year of the Salmon project – based on winter research expeditions in the North Pacific Ocean – was recognized for its achievement in fostering improved international cooperation to research and monitor Pacific salmon.



SAVE THE DATES!

- **2024 South Vancouver Island Gala**
Saturday, March 9
Victoria Conference Centre, Carson Hall
- **2024 Vancouver Gala**
Friday, April 26
Vancouver Convention Centre, West

psf.ca/EVENTS

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During unprecedented drought, PSF increased fish passage with partners across the province to help salmon continue their migration journey.

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Learn how local partners are using the latest drone technology to enhance salmon resilience to climate change.

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Experts are scoping a new B.C. salmon recovery strategy, drawing inspiration from Washington's tried and tested model.

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PSF scientists publish the first full review of B.C.'s hatcheries in 30 years.

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Fraser pinks return in the millions, while coho see a resurgence in the Strait of Georgia.

11 RESTORING KELP FORESTS

Supported by PSF's Community Salmon Program, Redd Fish Restoration Society is restoring vital salmon habitat on Vancouver Island's West Coast.

DONOR



SPOTLIGHT

"I have been salmon fishing on the West Coast for more than 40 years. I am very concerned about what I have witnessed over that time. Climate change has materially affected the ecosystem on the West Coast," says Earl Jessiman.

"Leaving a gift in my estate to the Pacific Salmon Foundation is an investment in the future of this special ecosystem and I believe the work of PSF and its partners will result in positive outcomes for salmon."

Hailing from Nova Scotia, Jessiman is a PSF donor through planned giving.

PSF is a partner of WillPower — a campaign that empowers all Canadians to create positive change through their wills. Learn how you can make an impact.

psf.ca/WILLPOWER

SAVING STRANDED SALMON



Photo: Brandon Deepwell

Pink salmon returning to xʔəlilwətaʔ in September 2023.

Extreme climate events like drought and flood can wreak havoc on salmon migrations. PSF worked with partners across B.C. this summer and fall during an unprecedented, province-wide drought to improve fish passage in rivers like xʔəlilwətaʔ where salmon were stranded.

In early September, tens of thousands of returning pink salmon were stranded by a 300-metre-long section of xʔəlilwətaʔ (Indian River) that went dry during extreme drought.

Severe drought conditions gripped watersheds across British Columbia this summer and fall, causing warm water temperatures, low oxygen levels, and low flows — conditions that can be devastating for salmon.

Pink salmon were returning to xʔəlilwətaʔ in strong numbers but encountered low river flows approximately six kilometres north of the river's estuary. The parched area interrupted their migration to their spawning grounds, delaying their journey and threatening their survival.

“There were too many fish for how little water there was,” says Graham Nicholas, senior environmental specialist with səliwətaʔ (Tsleil-Waututh Nation). “They pooled up into the deeper spots that were available, but soon used up all the oxygen. They started to die off pre-spawn.”

With zero rain in the imminent forecast, this migration bottleneck had potential to become a mass fish die-off.

So səliwətaʔ and Fisheries and Oceans Canada (DFO) struck a plan to help the stranded pink salmon move upstream and prepare for the returning chum salmon, expected a few weeks later. With support from PSF's rapid response drought team, crews quickly repaired the barrier within days by digging a trench through the disconnected gravel strip with an excavator, restoring river flows.



BEFORE:

Restoration progress at xʔəlilwətaʔ.



AFTER:

Photos: Brandon Deepwell

“I HAVE FISHED THE XʔƏ́LILWƏTƏʔ WATERS AND WOULD LIKE TO SEE FUTURE GENERATIONS HAVE THE OPPORTUNITY TO DO THE SAME.”

More than 18,000 stranded pink salmon adults successfully migrated upstream as a result of the restoration effort.

“We were not going to sit back and watch a full-scale climate disaster unfold. This work needed to be done in order to save tens of thousands of salmon,” says Nicholas.

“DFO’s Habitat Restoration Centre of Expertise engineers and biologists collaborated with sə́lilwə́təʔ technicians and biologists to excavate a channel to reconnect flows through the dry riverbed,” says Rebecca Seifert, a DFO restoration biologist. “With crucial support from PSF, our collective efforts resulted in the successful construction of a channel that was deep enough to facilitate salmon passage to spawning habitats upstream. This work also increased the flow of fresh, cold water downstream to pools where oxygen levels were getting dangerously low while the pink salmon were holding.”

REVITALIZING XʔƏ́LILWƏTƏʔ

In 2023, for the second consecutive year, sections of xʔə́lilwə́təʔ dried out. With nearly half a million salmon in the river when it ran dry this year, the recurrence of climate extremes is becoming a source of growing concern.

The xʔə́lilwə́təʔ watershed is a cornerstone of sə́lilwə́təʔ heritage, intertwined with their history, culture, and economy. sə́lilwə́təʔ continues to diligently protect this ecosystem, preserving its significance for future generations.

“The xʔə́lilwə́təʔ watershed has suffered major devastation over time. sə́lilwə́təʔ has taken our own initiatives to restore the lands and waterways, to ensure future uses,” says Michelle George, cultural technical specialist with sə́lilwə́təʔ Treaty, Lands and Resources.

“sə́lilwə́təʔ understands the interconnection between the lands and waters, making it that much more vital to carry on traditional and cultural practices throughout the homelands of sə́lilwə́təʔ. I have fished the xʔə́lilwə́təʔ waters and would like to see future generations have the opportunity to do the same.”

WHAT IS LIDAR?

LiDAR, or Light Detection and Ranging, measures distances to the Earth’s surface with pulsed lasers. This technology provides detailed three-dimensional information on our planet’s shape and surface features. For salmon research, LiDAR can provide detailed maps of streams and watersheds.

To better understand xʔə́lilwə́təʔ watershed dynamics, sə́lilwə́təʔ and DFO are gathering Light Detection and Ranging (LiDAR) data. This information will inform restoration plans, particularly for low flow river issues during the summer.

With funding from PSF, an external contractor conducted an aerial survey to collect LiDAR data in October from the xʔə́lilwə́təʔ estuary to the Meslilloet Creek Confluence.

DFO funding will support the data processing. LiDAR information will enable experts to map the river’s contours, identify areas prone to erosion, pinpoint obstacles blocking natural flows, and assess the health of riverbanks. It will also provide information on barriers that hinder salmon migration and habitat zones critical for salmon spawning and rearing.

Ultimately, access to LiDAR data will support the development of more effective restoration activities to revitalize the xʔə́lilwə́təʔ watershed.

Since July, PSF has approved \$330,000 in funding for more than a dozen urgent drought response projects to help combat the adverse impacts of climate change on salmon. These important projects emerged through a rapid response working group with DFO, the Province, and technical experts that PSF convened in the spring with the aim to plan ahead for anticipated drought-related issues.

Special thank you to the Province of B.C. for its support in kickstarting rapid drought response for salmon.

To support projects like these, donate today:

psf.ca/DONATE



Jane Pendray (PSF) and Graham Nicholas (sə́lilwə́təʔ).

Photo: Brandon Deepwell

DROUGHT RESPONSE ACROSS B.C.



Photo: Peter Olsen

TRANQUILLE RIVER

More than 2,300 pink salmon were counted in Tranquille River after drought response efforts re-connected the river to Kamloops Lake, re-establishing flows.

This project was led by DFO with support from Secwépemc Fisheries Commission, water licence holders, BC Parks, and PSF.



Photo: Brandon Deepwell

BRIDGE RAPIDS

In the Fraser Canyon, thousands of salmon successfully migrated past Bridge Rapids thanks to drought response in October that improved fish passage.

Xwísten (Bridge River Indian Band), Xaxli'p (formerly known as Fountain Band), First Nations Fisheries Council of B.C., Upper Fraser Fisheries Conservation Alliance, DFO, the Province, and PSF supported this project.

A LOOK FROM ABOVE: HOW DRONES CAN SUPPORT SALMON BATTLING CLIMATE CHANGE

With climate change comes warming waters — a potential death sentence for salmon.

As water warms, salmon's metabolism speeds up, forcing them to burn energy faster. On top of that, warm water holds less oxygen, causing stress for returning adults.

During extreme drought this year, some rivers across B.C. reached temperatures well above 20°C — a dangerously high threshold for cold-water fishes. And after three years of scorching summers, these conditions may be the new normal for salmon.

Thankfully, nature is equipped to help salmon adapt. Thermal refuges are micro-habitats where cool groundwater pools up in rivers, places that can give salmon some relief from high stream temperatures. Since salmon seek out these spots, there is a growing push to consider cold-water refuges in restoration efforts.

TRACKING COLD HAVENS IN B.C. STREAMS

PSF's Salmon Watersheds Program is supporting First Nations partners to identify and protect these natural cooling centers for salmon. With technical expertise from BCIT's Remotely Piloted Aircraft Systems Hub, partners across B.C. can take thermal images of water surfaces using drones with infrared cameras.

The drones allow surveying of large areas where in-stream temperature loggers might not capture isolated refuges. By understanding where cool spots occur, planners can improve habitat protection and restoration strategies to increase Pacific salmon's resilience to climate change.

PSF's Salmon Watersheds Program has tailored their support based on partner needs. To date, PSF and BCIT staff have used drones to scan for thermal refuges in the Kitwanga River for the Gitanyow Fisheries Authority. Meanwhile, working with biologists from Secwépemc Fisheries Commission, PSF supported data collection in the Deadman River.

Murray Ross, director at the Secwépemc Fisheries Commission, emphasized that "we appreciate PSF sharing technical expertise to help us build our capacity. Using our drone, we will be expanding our hydrometric program into other salmon-bearing watersheds in Secwepemcúl'ecw."

USING TECH FOR SALMON

The streams are chosen based on their importance as migratory and spawning grounds for salmon, as well as their sensitivity to higher temperatures. To capture the right thermal images, the drones are programmed with a pre-mapped route. Each drone then flies itself over the desired area to collect data, which technicians download and process to map thermal refuges.

"Perhaps the best reason to employ drone technology to detect and map thermal refuges is the safety factor," says Dr. Eric Saczuk, Head of Operations at BCIT's Remotely Piloted Aircraft Systems Hub.



Photo: Braela Kwan


Photo: Eric Saczuk

"With the camera in the sky, the risks associated with traditional data collection like slips, falls, or bear attacks are drastically reduced."

Using drones to study salmon streams has some limitations – like the inability to record deeper water temperatures or fly through overhanging vegetation. Nonetheless, the sheer volume and precision of data these devices collect is remarkable. In the same amount of time it takes for a team to wade through a stream and collect a handful of data points, a drone can record millions of temperature readings with an impressive $\pm 0.2^{\circ}\text{C}$ accuracy.

As climate change becomes increasingly apparent in B.C., PSF is using this project to support concerned communities and improve the resilience of salmon habitats.

Don Ignace, Skeetchestn Natural Resources Operations Manager, hopes the drones will help identify thermal refuges to protect in the Deadman River. "Those areas are critically important for salmon, especially in the face of climate change. We have plans to use the information to protect those sites in the coming years."

PSF is thankful for the generous support of MITACS and the British Columbia Salmon Restoration and Innovation Fund. 



The Deadman River – a tributary of the Thompson River – where drones are helping map thermal refuges.

Photo: Braela Kwan

SALMON RECOVERY LESSONS FROM THE EVERGREEN STATE

Patchwork efforts to manage and conserve salmon in B.C. lack coordination. A tried and tested model from Washington state inspires planning for a new provincial salmon recovery strategy.



To begin envisioning how the Evergreen State's methods can be applied in B.C., Rutherford interviewed Washington Salmon Recovery representatives and B.C. salmon experts to develop a roadmap.

KEY INGREDIENTS FOR SUCCESS

Following consultations with partners, Rutherford determined that a lasting British Columbia salmon recovery strategy must incorporate:

- Long-term funding
- Strong science and Indigenous knowledge to guide project and funding decisions
- Project development and implementation from the ground up, led by local communities


Participation and collaboration from Crown governments, First Nations, local communities, and environmental organizations will be necessary to activate a coordinated approach in B.C. In theory, the model would create a fair and equitable way of sharing salmon recovery decision-making and empower local watershed actors to strengthen their grassroots salmon recovery efforts.

Washington's model operates at three levels: a Governor's salmon recovery office responsible for state-wide and high-level coordination, regional organizations to oversee recovery plans, and watershed-based groups to lead on-the-ground habitat efforts. These three bodies work together to coordinate investments, funding, and actions.

The evolving B.C. salmon recovery strategy also proposes a three-tiered model for the province to ensure an inclusive and effective approach:

1. Collaborative partnership between federal, provincial, and First Nations governments
2. Regional organizations focused on recovery planning
3. Place-based, watershed-focused organizations supporting technical projects

An estimated \$80 million budget is required to initiate the model and advance on-the-ground work.

"When I look at the options in front of us for how can we work together to be more effective in facilitating salmon recovery, this idea of having a three-tier model is better than anything else I can think of. It might be our best option for channeling our energy, passion, and resources into something that's really going to make a difference," says Rutherford. 

The illustrations by Erica Bota represent aspirational themes of the B.C. salmon recovery strategy discussed by participants of the Pacific Action Dialogues.



British Columbia currently lacks a coordinated action plan for salmon recovery.

Salmon experts in B.C. are exploring solutions to this dilemma at a time when nearly half of salmon populations in the province are in some state of decline.

Through a forum called the Pacific Salmon Action Dialogues, a partnership between PSF and the First Nations Fisheries Council of B.C. (FNFC), with collaboration from salmon leaders across the province, participants came to a consensus that B.C. needs a new collaborative structure for salmon recovery. Their discussions have drawn inspiration from the Washington State Salmon Recovery Strategy.

PSF and FNFC tapped salmon biologist Tom Rutherford, who formerly worked for DFO and is currently Director of Strategic Priorities for the Cowichan Watershed Board, to help scope what a "made in B.C." salmon recovery model could look like.

Based on Rutherford's research, British Columbia can learn from the 'Washington Way', which has two decades of real-world applications.

"We're at a tipping point for salmon in B.C. for many reasons — the major one being climate change. We need to do something different than what we're doing now," says Rutherford. "Washington has clear legislation for collaborative salmon action. With their mandates, it's not optional. British Columbia doesn't have those legislative requirements, so we need to work around that and find the foresight to create our own system that centres First Nations leadership."

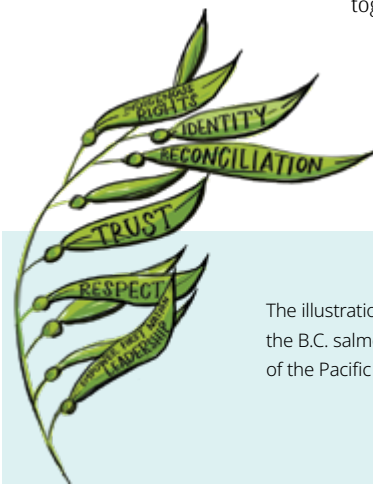




Photo: Danny Swainson

WHAT'S NEXT FOR B.C. HATCHERIES?

PSF researchers have completed a review of Pacific salmon hatcheries in British Columbia. The first of its kind since the mid-1990s, the review led to 14 reports and several recommendations to improve hatchery effectiveness and operations.

Hatcheries have been a key tool to support, conserve, and assess the state of Pacific salmon in B.C. for almost half a century.

Under the DFO's Salmonid Enhancement Program (SEP), B.C. hatcheries, spawning channels, and small community projects currently release approximately 250 million juvenile Pacific salmon per year. Surprisingly, this only accounts for a tiny fraction (around five per cent) of the five billion juveniles released across the North Pacific region, but it's still a significant investment of capital and resources for Canada.

While hatcheries can produce abundant salmon, they can also have negative impacts on wild salmon. Scientists, First Nations, and anglers alike often pose the question: are B.C.'s hatcheries effective?

In a bid to find answers, PSF launched the Hatchery Effectiveness Review in 2019, led by Dr. Isobel Pearsall, director of PSF's Marine Science Program, and Science Advisor Dr. Brian Riddell. SEP was very supportive of this work being undertaken.

The study was initially prompted by results from PSF's Salish Sea Marine Survival Project, where researchers on Vancouver Island found that wild Chinook salmon survived at three times the rate of hatchery Chinook in the Cowichan River. The results warranted further investigation and a broader geographic focus.

"We've been releasing hatchery-produced fish for more than five decades, but it hasn't translated to consistent and abundant salmon returns," says Dr. Pearsall. "It became obvious that a comprehensive review of hatchery effectiveness was needed to guide future management decisions. In such a large and diverse program like SEP, there's always room for improvement."

When DFO unveiled SEP in 1977, it was an ambitious strategy that set out to restore salmon populations and double annual commercial catch by 2005. But the objectives set by SEP in the 1970s have shifted

considerably in the wake of social, political, and environmental change over the years. Today, SEP operates 16 large-production hatcheries and seven spawning channels. It also supports many community-run, smaller-scale hatcheries, many of which regularly receive PSF grants.

PSF's review focused on three main components associated with hatchery effectiveness in SEP: hatchery release strategies, wild and hatchery fish interactions, as well as genomics opportunities to study salmon. The review resulted in 14 reports, each available at psf.ca/HATCHERYEFFECTIVENESS.

OPTIMIZING RELEASE STRATEGIES

In February 2023, PSF's Hatchery Effectiveness Review published its first peer-reviewed study. PSF scientists assessed that SEP's major hatcheries have productive release strategies that are resilient to extensive change in natural environmental conditions. They did this by analyzing data from DFO release experiments and from tagged Chinook and coho dating back to 1972.

"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 led the release strategy study.

However, depending on the facility and environmental factors encountered in any given year, results revealed that some SEP hatcheries might benefit from changes to 'size-at-release' and 'time-of-release' practices beyond those historically used.

PSF'S FIVE KEY RECOMMENDATIONS:

1. Integrate a regional management plan for each hatchery.
2. Improve data management and reporting capabilities of hatcheries.
3. Create clear objectives to assess future hatchery effectiveness.
4. Invest in SEP's Community Involvement Program.
5. Establish an Enhancement Science program for the DFO Pacific region, focused on genomics research and monitoring.

“WE’VE BEEN RELEASING HATCHERY-PRODUCED FISH FOR MORE THAN FIVE DECADES, BUT IT HASN’T TRANSLATED TO CONSISTENT AND ABUNDANT SALMON RETURNS. IT BECAME OBVIOUS THAT A COMPREHENSIVE REVIEW OF HATCHERY EFFECTIVENESS WAS NEEDED TO GUIDE FUTURE MANAGEMENT DECISIONS.”



Photo: Benjamin Fortini

James and her team analyzed 21 Chinook and 16 coho hatcheries. Data showed that for Chinook, survival rates increased for fish released earlier than most hatcheries’ historical averages. The opposite was true for coho, who were more likely to survive when released later than previous release dates. Based on results from these hatcheries, releasing fish at larger sizes and at different times could result in higher survival rates.

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

STUDYING INTERACTIONS

The multi-generational impact of mixing hatchery and wild salmon is still poorly understood. To investigate this, researchers undertook several analyses, including assessing the contribution of Canadian hatcheries to fisheries and the ability for hatchery-reared salmon to rebuild natural populations. They also developed models to determine the influence hatchery releases have on local wild salmon and studied trends in the biological characteristics of B.C.’s Chinook salmon.

Unfortunately, analyses were limited by poor data, but researchers found SEP hatcheries have certainly contributed to harvests and are effective at producing juvenile fish.

However, they also demonstrated that SEP hatcheries to date have not been able to clearly prove that hatcheries contribute to rebuilding natural salmon production in the longer term. Science showed that traditional hatchery operations provide a ‘boost’ in the number of spawners during the period they are released, but over time, the boost reverts to a depressed spawning population. These findings are consistent with other studies in the United States and elsewhere.

“Our results indicate that short-term supplementation is seldom successful in restoring and sustaining natural populations,” says Dr. Brian Riddell. “But further research is needed to establish whether our results can be directly attributed to interactions between hatchery and wild salmon or other factors such as changing local habitats and environments.”

TOOLS FOR THE FUTURE

Hatchery fish generally have lower survival rates than wild salmon. There is no silver bullet to this problem, but genomics science is

WHAT IS GENOMICS?

Genomics is the study of an organism’s genomes — its total genetic material — including how it is affected by its environment. Genomics has been successfully implemented to improve human healthcare, livestock, and aquaculture production and could be used to increase salmon survival from B.C. hatcheries.

touted as a tool that could boost survival rates of hatchery salmon if applied correctly to hatchery management.

PSF’s review included two reports about genomics technologies and possible applications within SEP hatcheries. The review recommended establishing a robust, integrated science-based program to inform hatchery decision-making.

This would allow further research into epigenetics and Parentage-Based Tagging, two branches of genomics particularly relevant to hatcheries. Both can be used for accurate stock assessment, estimating returns, and for conducting release strategy experiments.

Creating a science-based program in B.C., that relies on data from modern technologies like genomics, could make hatcheries more effective by arming hatchery managers across SEP with better information to make decisions.

Positive discussions are already underway with SEP to find ways of implementing all five of PSF’s recommendations into the Program. By working collaboratively with partners and stakeholders, together we can improve hatcheries to better support resilient salmon for the future.


Funding for this project was provided by the BC Salmon Restoration and Innovation Fund, a program funded jointly between Fisheries and Oceans Canada and the Province of British Columbia. 

Photo: Mirko Diaz

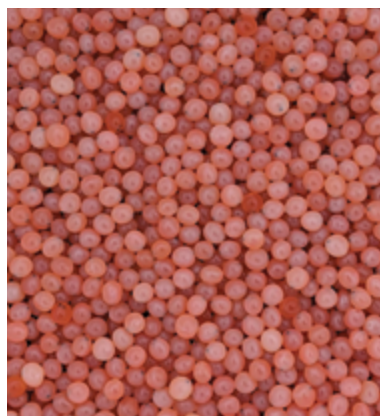


Photo: Braela Kwan



STATE OF SALMON: REMARKABLE YEAR FOR PINKS AND COHO

This summer's province-wide drought made it a challenging year for salmon. But one good news story that has caught the attention of scientists and anglers was the **resurgence of coho in the Strait of Georgia**, with many saying it was the best summer season in more than three decades.

Historically, coho catches were upwards of one million annually. But when coho mysteriously disappeared from local waters in the early 1990s, fishers were restricted by DFO from retaining any coho in much of the Strait of Georgia and Juan De Fuca. Catches dropped to a tenth of the level seen before 1995 and have not recovered since.

However, the reason behind this summer's coho comeback — and their initial disappearance 30 years ago — remains unclear. Theories range from environmental variations in ocean salinity levels to physiological factors, such as the growth rate of juveniles in their first year in the ocean.

"Coho distribution inside and outside of the Strait of Georgia is still poorly understood," says PSF's Will Duguid, who conducts research on the foraging habits of coho and Chinook in the Strait. "It's difficult to know for sure what was behind this summer's dramatic shift in abundance."

PSF's Marine Science Program has several initiatives carrying out research which could provide answers to this mystery.

This includes the Bottlenecks to Survival study, which investigates when and where coho, Chinook, and steelhead face critical mortality periods or "bottlenecks" during their freshwater and early marine periods of life.

Duguid leads unique winter field research that uses Passive Integrated Transponder (PIT) tags to track the movements of salmon during their first winter in the Strait. The tags track individual fish back to their spawning river, gathering data on survival rates at different life stages. The results can help researchers paint a picture of areas coho are favouring in the Strait.



Will Duguid leads research on the foraging habits of coho and Chinook in the Strait of Georgia.

Photo: Katie Innes

Another promising avenue of research that could shed light on coho activity is the Adult Salmon Diet Program — a PSF Citizen Science project run out of the University of Victoria.

The program, also overseen by Duguid, works by collecting coho and Chinook stomachs, which are then analyzed in the lab to reveal what they feed on throughout the year. The results can determine the type of forage fish abundant in certain locations and how food webs and ecosystems might be adapting to climate change.

"Spending time monitoring salmon out in the ocean is the best way to figure out whether unexpected coho distribution this year was simply an anomaly or a sign of things to come," says Duguid. "PSF's research is vital for the future management of Strait of Georgia salmon fisheries."

BUMPER YEAR FOR FRASER RIVER PINKS

It was a good year for salmon spotters in the Fraser River, as the pink salmon run returned substantially more fish than were initially forecasted. The Pacific Salmon Commission increased its initial projections from an estimated return between 6.1 million and 8.6 million fish to a whopping 10.3 million. By November of this year, 10.5 million Fraser pinks had returned to their home river.


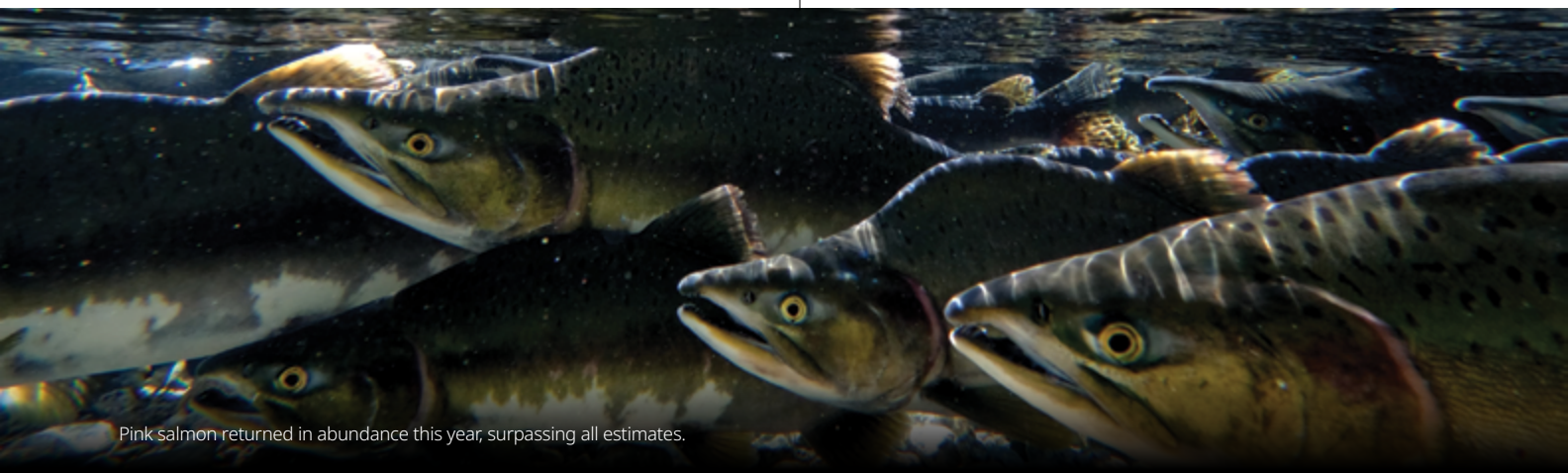
Pink salmon return in abundance in odd years to the Fraser River, so Lower Mainland salmon spotters can next expect to see large numbers of returning pinks in 2025. 

Photo: Brandon Deepwell



Pink salmon returned in abundance this year, surpassing all estimates.



An aerial view of a giant kelp bed in Barkley Sound.

Photo: Emily Fulton

TACKLING KELP DATA GAPS IN BARKLEY AND CLAYOQUOT SOUNDS

Healthy kelp is essential to the well-being of Pacific salmon in B.C.

Every summer, millions of juvenile salmon rely on kelp beds to seek refuge from predation and forage for food before they brave the open ocean. Despite its invaluable role in marine ecosystems, there was very little baseline information available for kelp in northern Barkley and Clayoquot Sounds near Tofino — until now.

A multi-year kelp monitoring project by the Redd Fish Restoration Society, in partnership with the Toquaht and Yuułuʔiłʔatḥ Governments, and the Tla-o-qui-aht and Ahousaht First Nations, is helping bridge this data gap in the Barkley-Clayoquot region. The research centres around the health and distribution of kelp canopies, in hopes of better understanding these habitats and uncovering their role in juvenile salmon survival.

“Kelp forests are among the most productive ecosystems globally,” says Emily Fulton, marine coordinator at Redd Fish. “The data collected from this project will help to inform decisions on future restoration activities, local economic opportunities, and the necessity for further research.”



Giant kelp (*Macrocystis pyrifera*).

Photo: Graeme Owsianski

THE STATE OF KELP

While supporting thousands of species throughout the northeast Pacific, kelp also provides invaluable ecosystem services for humans, helping shield us from the increasingly intense storms ravaging our coastline.


Kelp along Vancouver Island's West Coast has long faced ecological pressures. Notably, the depletion of top predators like the sea otter has led to an imbalance in sea urchin populations — which can quickly devour kelp if left unchecked.

Climate change also comes into play by exacerbating seasonal temperature changes, impacting currents, and affecting nutrient flows. Researchers believe that climate impacts could lead to the further decline of kelp forest habitats.

Redd Fish first used drones to document the spatial extent of various kelp beds in 2021, which they have since repeated yearly. Working closely with partner nuučaanuḥ Nations, they identified primary sites for monitoring in Barkley and Clayoquot Sounds which contain both giant kelp and bull kelp. Researchers have now begun identifying trends in the distribution, density, and health of these ecosystems.

The next step? Incorporating environmental DNA (eDNA) collection to uncover clues about salmonid presence and documenting year-round oceanographic data to get a holistic picture of these ecosystems. PSF funding will help cover the costs of this data collection to shed light on future restoration priorities — including to help save salmon.

“Kelp forests foster the vitality of culturally and socioeconomically significant species like Pacific salmon,” says Fulton.

“Continuing to collect spatial data, oceanographic information, and eDNA samples will give insight into the health of these ecosystems and the nearshore marine environment as a whole. The ecosystem services that kelp yields are inestimable, warranting a serious commitment to long-term monitoring.” 

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Redd Fish employees, Marie-France Roy and Hanako Kimoto, measuring bull kelp.

Every year, PSF grants up to \$2 million to advance more than 200 community-led salmon conservation projects. From habitat restoration to invasive species removal and groundbreaking research, your support helps bring more boots on the ground for salmon.

The Community Salmon Program, launched 34 years ago, empowers volunteers and partners to act for salmon. The program accepts new

applications for grants each spring and fall. Since 1989, PSF has engaged over 30,000 volunteers through 3,000 projects across B.C. and the Yukon.

The Community Salmon Program is also supported by generous individuals and corporations, including Mosaic Forest Management, Neptune Terminals, Paper Excellence, Pembina, Seaspan, Secure Energy, and Sutherland Foundation Inc.

Photo: Graeme Owsianski



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CEO AND PRESIDENT, PSF**

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