



PEOPLE FOR SALMON

PACIFIC SALMON FOUNDATION REPORT 2021

2021 A YEAR IN REVIEW

AT THE PACIFIC SALMON FOUNDATION (PSF),
OUR PURPOSE IS TO SAVE AND RESTORE WILD PACIFIC SALMON.

The decline in Pacific salmon is one of the most urgent environmental concerns for British Columbians. More than 85 per cent of B.C. residents indicated a high level of concern for dwindling salmon populations. Public concern, combined with unprecedented **climate-change** events — heat dome, wildfires, drought, floods — and the integral nature of salmon to ecosystems, results in a clear challenge that is urgent and important to the people of B.C.

A large cross section of British Columbians care deeply about the state of Pacific salmon and appreciate the complex risk factors contributing to serious declines of many populations. Pacific salmon need our help urgently, and we must do everything we can to save them.

— Michael Meneer, President and CEO Pacific Salmon Foundation

We are pleased to share 2021 progress highlights fuelled by donor dollars, grants, and partnerships. These dollars support People for Salmon, those who step up, wade in, and work tirelessly to make a difference in saving and restoring salmon. Our sincere thanks to all the People for Salmon, the backbone of PSF.

We're salmon first, salmon always — and we don't go it alone.

PSF BOARD OF DIRECTORS:

Russell Ball, Ross Beaty, Ward Bond, Anson Frost, Brenda Gaertner, Jeff Giesbrecht, Pamela Goldsmith-Jones, George Iwama, Peter Lister, Murray Ned, Kevin Nugent (Chair), Jason Quigley, Paul Sprout, Gord Sterritt, Shauna Towriss

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PSF SALMON ENDOWMENT FUND SOCIETY:

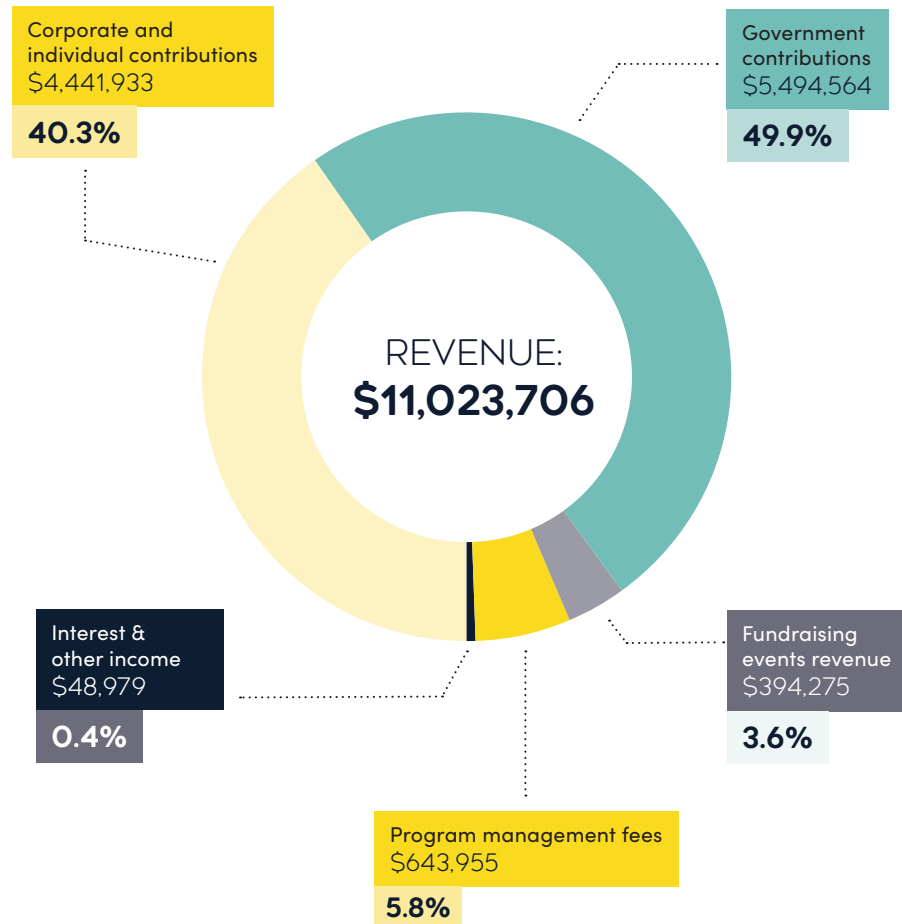
David Elliott, Roger Flowerdew, Robert Gayton, John Hodgins, Jim Hudson, George W. Hungerford, Anne Kinvig, Doug Knight, Terry Lanigan (Chair), and W.J.D. (John) Woodward.

ADVISOR: Rick Bourne

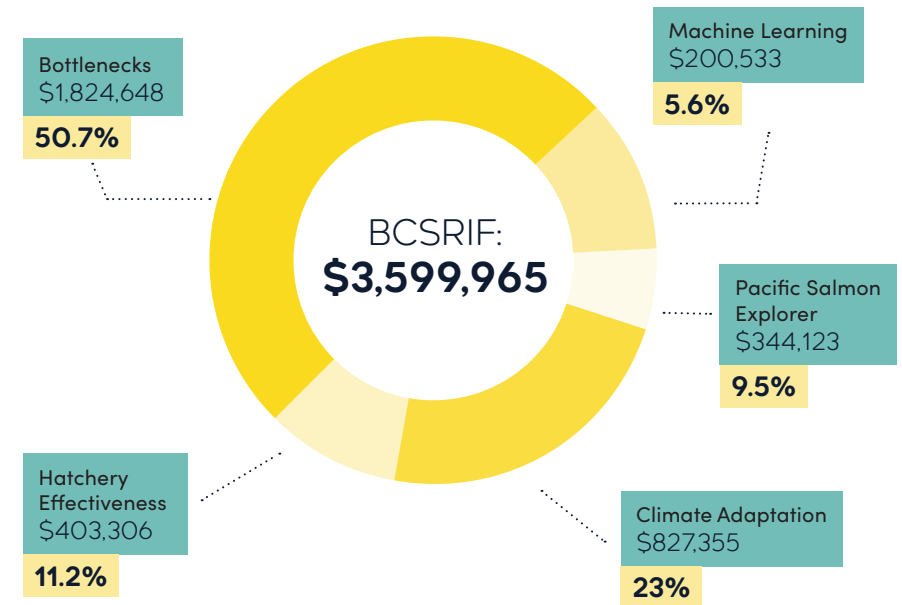
PACIFIC SALMON FOUNDATION STATEMENT OF OPERATIONS

YEAR END, DECEMBER 31, 2021

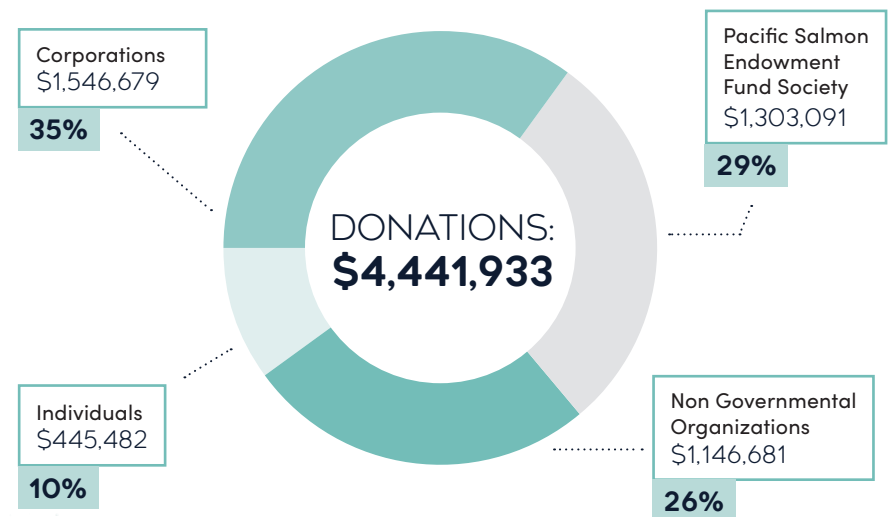
TOTAL REVENUE



REVENUE BY BC SALMON RESTORATION AND INNOVATION FUND-BCSRIF

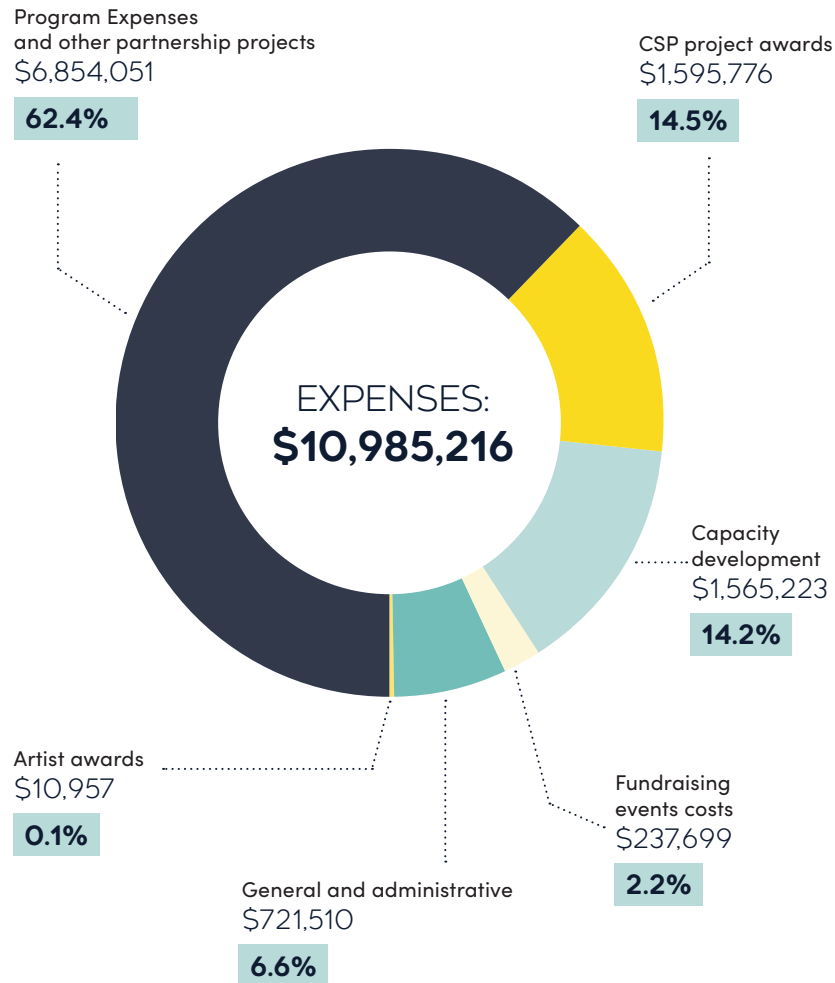


REVENUE BY DONATIONS

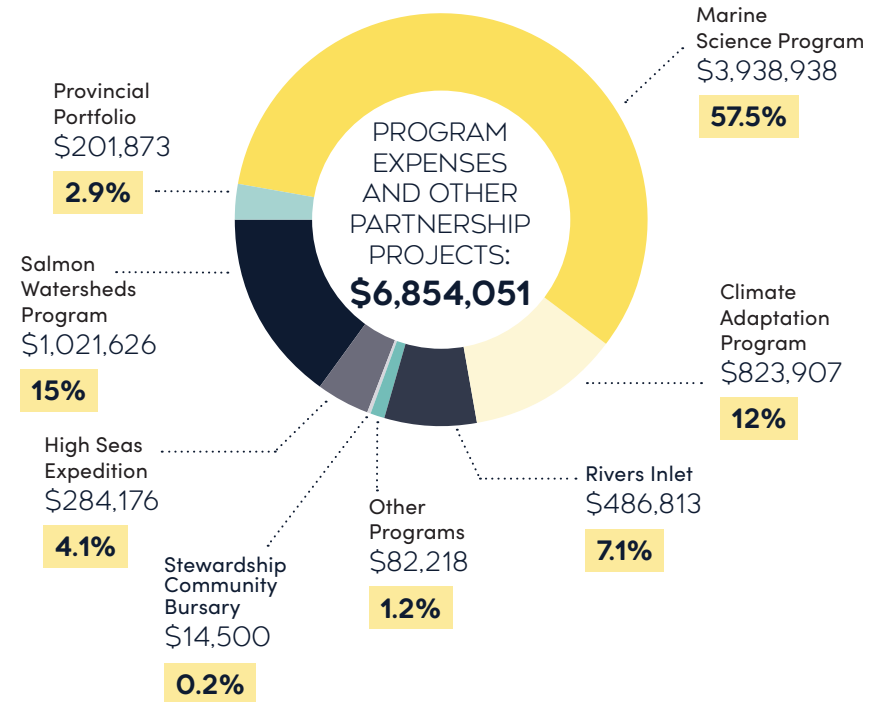


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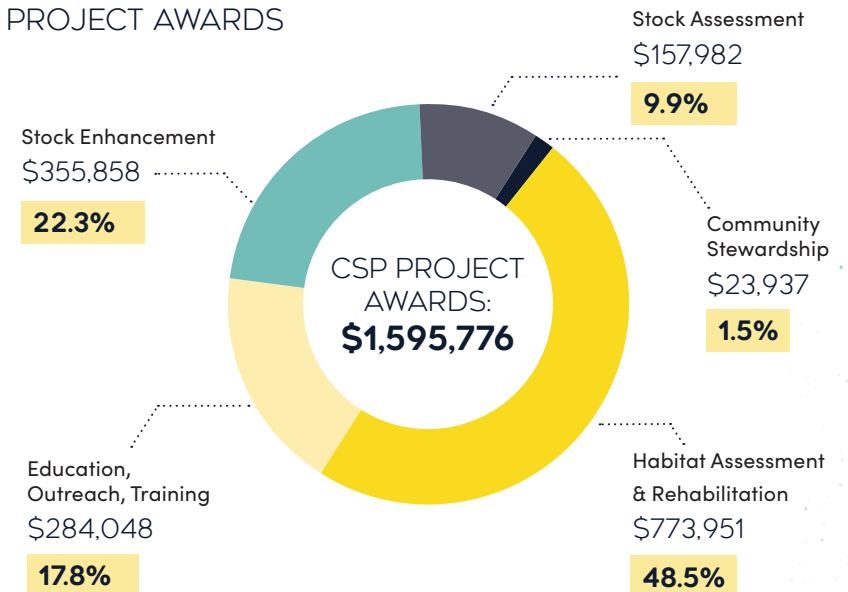
TOTAL EXPENSES



PROGRAM EXPENSES



COMMUNITY SALMON PROGRAM PROJECT AWARDS





PACIFIC SALMON
FOUNDATION

2021 HIGHLIGHTS



Photo by Tavish Campbell

MARINE SCIENCE PROGRAM

RESEARCH AND ACTION
FROM SHORES TO OPEN OCEAN

The **Salish Sea Marine Survival Project**, a collaboration between Long Live the Kings and PSF, wrapped up in 2021; the present **PSF Marine Science Program** evolved from the project.



Following the successes of the Salish Sea Marine Survival Project, we developed the Marine Science Program, focused on addressing key recommendations, applying actions to promote restoration and conservation of salmon, and continuing critical science. The program ranges from nearshore habitat restoration to salmon health, and is enhanced by the energy and passion of our many partners.

— Dr. Isobel Pearsall,
Director, Marine Science Program



Photo by Matt Hagen

200+ PARTICIPANTS | 60+ ENTITIES | \$40 MILLION |
7 YEARS | 2 COUNTRIES | 1 QUESTION

Photo by
Matt Hagen

WHAT AFFECTS THE SURVIVAL OF YOUNG CHINOOK, COHO, AND STEELHEAD IN THE SALISH SEA?

KEY FINDINGS:

- Twelve pathogens associated with poorer body condition and survival for Chinook, coho, and sockeye salmon in the southern Strait of Georgia were discovered. The first study to find *Piscine orthoreovirus* and associated diseases in B.C.'s farmed salmon, the results prompted PSF to support phase-out of open-net-pen salmon aquaculture in the province.
- Fifteen previously undocumented viruses were discovered in Pacific salmon.
- A study focused in the Cowichan River found that wild juvenile Chinook survived at twice the rate of their hatchery-produced counterparts. The big difference in survival rates between hatchery-produced and wild salmon has inspired a major spin-off study of hatchery effectiveness.
- Critical bottlenecks to survival occur in the first few weeks at sea and during the initial winter of the salmon lifecycle. Pacific herring are a key food source during this period, and their availability likely helps determine salmon survival and growth.
- The major impacts of predation were identified. Several recommendations emerged: removal of log booms in estuaries, water flow regulations, large-scale marine debris clean up, and nearshore and estuary habitat restoration projects.

Special thanks to RBC Foundation.



RESILIENT COASTS FOR SALMON

Coasts provide key habitat for spawning forage fish — crucial for Pacific salmon. Climate change, sea-level rise and man-made structures contribute to habitat loss. Thanks to \$1.9 million from Environment and Climate Change Canada's Climate Action and Awareness Fund, the Resilient Coasts for Salmon project launched to build public awareness and community capacity to adopt nature-based solutions. The team works with communities, stewardship groups, and coastal First Nations.

We can take action in our coastal communities by using nature-based solutions to naturalize hardened shorelines, incorporating policies that help us plan for sea-level rise, and making changes in our daily lives to reduce our environmental impact on our shorelines.

— Kyla Sheehan, Manager and Biologist,
PSF Resilient Coasts for Salmon project

**17 PARTNERS | 3 DEMONSTRATION SITES UNDERWAY |
8 GREEN SHORES TRAINING EVENTS**

HATCHERY EFFECTIVENESS REVIEW

PSF undertook a comprehensive review of hatchery release strategies in B.C. The report provides hatchery-specific information for managers to consider when planning releases and identifies locations with the greatest opportunities for improvement.


The Hatchery Effectiveness Review is supported through the BC Salmon Restoration and Innovation Fund (BCSRIF), a joint funding program by the Governments of Canada and British Columbia.

Photo by Maria Catanzaro

The results explore the relationships between release strategies and salmon survival, and help us gain a better understanding of what works where. Both hatchery and wild salmon survival depend on the conditions they face as juveniles, so release strategies matter and there is no one-size-fits-all solution.

— Sam James, PSF Biologist

Salmon eggs. Photo by Mirko Diaz

A photograph showing three people in a river. In the foreground, a man in a blue shirt and waders is working on a black pipe. Behind him, a woman in a blue hat and sunglasses is also working on the pipe. In the background, another person is visible. The river is surrounded by green vegetation.

Team installs PIT antenna-array system.

BOTTLENECKS TO SURVIVAL

Competition, climate change, and predation adversely impact salmon. In partnership with the BC Conservation Foundation, DFO, BC Ministry of Food and Agriculture, and the University of Victoria, the Bottlenecks Program aims to pinpoint the events leading to declines in wild and hatchery Chinook, coho, and steelhead. So far, more than 100,000 fish have been tagged with Passive Integrated Transponders (PIT), and tagging continues for freshwater and marine-life phases to develop an understanding of where survival bottlenecks occur. PIT tag-detecting antenna arrays have been installed in several river systems on Vancouver Island.

This four-year project is funded through BCSRIF.

This project requires building collaborations with a multitude of partners to identify the events that influence the trend of declining salmon populations. The Bottlenecks study using PIT-tag technology will help us determine what factors we can control to improve salmon survival.

— Jamieson Atkinson, Project Co-manager and Biologist, British Columbia Conservation Foundation, a partner in the project.

30+ PARTNERS | 100,000 FISH TAGGED | 8 RIVERS WITH ARRAYS



Photo by Rob Newell

CITIZEN SCIENCE

To better understand ocean conditions that drive food availability, volunteers provide a consistent stream of precise, almost real-time data on the Strait of Georgia.

Phytoplankton serve as the foundation of the entire marine ecosystem, and their dynamics in the Strait were unusual in 2021. Citizen Scientists observed and collected samples from thick and colourful blooms (i.e. *Noctiluca*, *Heterocapsa*). Although these species are not toxic, they cause cascading impacts to the ecosystem and food web. Algae responsible for shellfish harvest closures were among the highest observed on record. There were also temporal shifts in species dominance likely related to the unusually hot temperatures from the heat dome. Overall, surface waters were warmer and fresher than usual in the Strait in 2021.

“Our Citizen Science volunteers are amazing. I get to witness firsthand how passionate they are and how tirelessly they contribute their time and talent. Last year, they collected more than 5,000 samples that will help us understand conditions which are critical to salmon in the Strait.”

— Svetlana Esenkulova, Biologist, PSF Citizen Science Oceanography Program.

121 VESSEL TRIPS | 5,449 SAMPLES COLLECTED | 64 LOCATIONS

STRAIT OF GEORGIA DATA CENTRE

With 54 educational maps and more than 12,000 documents, the Data Centre provides a one-stop shop for information on ecology, oceanography, and human use. In 2021, the centre released:

- The *Strait of Georgia Marine Reference Guide*, an interactive map that provides more than 400 spatial data layers on subjects from salmon stomach contents to hazardous debris in estuaries.
- Story maps covering the following topics:
 - Novel technologies in the Salish Sea
 - Invasive European Green Crab in B.C.
 - The Diet of Adult Chinook and Coho Salmon
 - Climate Action for Salmon

**54 EDUCATIONAL MAPS | 12,000+ DOCUMENTS |
1 COMPREHENSIVE RESOURCE**

SALMON HEALTH PROGRAM

To better understand how infectious agents affect salmon, the program—a collaboration with DFO's Dr. Kristi Miller and her laboratory — launched in 2021; the team applies cutting-edge genetic tools to monitor disease-related and environmental stresses in wild Pacific salmon, gauges impacts from open-net salmon farming, and identifies solutions to the problems uncovered.

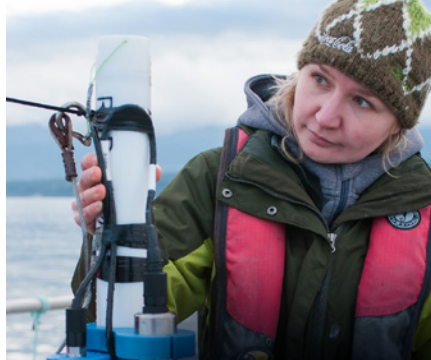
The team published important findings indicating that *Piscine orthoreovirus* came to B.C. from Norway with the advent of salmon farming and now transfers regularly from farmed to wild salmon.

Working to support the Broughton Aquaculture Transition Initiative, run by the Mamalilikulla, 'Namgis, and Kwikwasut'inuxw Haxwa'mis First Nations, PSF helps monitor the health of salmon on farms and conducts eDNA water monitoring to support First Nations-led observation and regulation.

PSF experts testified to Parliament's Standing Committee on Fisheries and Oceans and participated in DFO consultations on its commitment to transition away from open-net salmon farming by 2025.

HIGH SEAS RESEARCH

Fish that grow faster, survive better, and the “readiness” of juvenile salmon to survive winters in the Gulf of Alaska may be determined during the first months at sea. The 2019 and 2020 voyages tested this hypothesis. 2021 saw the planning and coordination of the largest international effort for open ocean salmon research with scientists from Canada, Japan, the Republic of Korea, the Russian Federation, and the United States headed out to sea in the 2022 expedition organized through the North Pacific Anadromous Fish Commission (NPAFC).



These studies link the Bottlenecks to Survival project to the future ocean survival of juvenile salmon, providing a better picture of what impacts salmon survival. The first two expeditions’ research results summarized by Dr. Brian Riddell in NPAFC’s Technical Report No. 18 included an extensive review of salmon production trends in the North Pacific region.

Special thanks to generous donors: Parkland and Canadian Fishing Company.



Photo by Amy Romer.

SALMON WATERSHEDS PROGRAM

The Salmon Watersheds Program works to inform key issues related to conservation and management of Pacific salmon. Convening people across disciplines, organizations, and levels of government, the program works to establish a common understanding of the state of salmon and their habitats, and supports partners in using this information to develop community-led monitoring and stewardship plans.



THE PROGRAM'S WORK FOCUSES ON:

1 DEMOCRATIZATION OF INFORMATION



Making Pacific salmon data publicly accessible through interactive online tools.

2 APPLIED RESEARCH



Developing and applying new approaches for assessing conservation risks and evaluating management actions for salmon.

3 STATUS ASSESSMENTS



Completing data-driven assessments of wild Pacific salmonid populations and their habitats.

4 STRATEGIC PLANNING



Supporting partners in developing strategic salmon conservation, restoration, and monitoring plans.



Photo by Leah Honka

With more than 90 per cent of all genetically distinct populations now available in the Pacific Salmon Explorer, we have established a common foundation of information for better understanding the state of Pacific salmon and their habitats in B.C. This is essential for informing conservation and management decisions that support salmon resilience.

— Dr. Katrina Connors, Director,
PSF Salmon Watersheds Program

PACIFIC SALMON EXPLORER EXPANDS

Haida Gwaii was added to the Pacific Salmon Explorer (PSE) as a collaborative effort with Haida Fisheries, DFO's Salmon Enhancement Program, Parks Canada, the Gowgaia Institute, the Hecate Strait Streamkeepers, and independent salmon experts. Together they identified and helped document local salmon spawning areas and summarized the best data on the 765 salmon populations that spawn in Haida Gwaii. The tool now has information about more than 90 per cent of salmon across the province.

**90% OF B.C.'S GENETICALLY DISTINCT SALMON POPULATIONS |
29 GENETICALLY DISTINCT SALMON POPULATIONS ASSESSED |
16 NEW SALMON HABITATS IDENTIFIED**



Photo by Julian Heavyside



LOWER FRASER RIVER HABITAT RESTORATION PLANNING TOOL

In collaboration with the Lower Fraser Fisheries Alliance (LFFA), the Salmon Watersheds Program developed a custom online planning tool to support the development of a habitat restoration plan for the Lower Fraser River. Working alongside LFFA member-Nations, the map-based tool visualizes

local habitat pressures, historical restoration projects, and restoration priorities identified by the Lower Fraser Nations. An online story map outlines the state of salmon habitats and populations in the Lower Fraser River, and highlights the need for a coordinated, community-led approach to restoration.

“The Sto:lo have always had an inherent obligation to look after resources within our territories, Sohl Temexw. That obligation comes with looking after seven generations back to the time of our ancestors and seven generations forward. When governments were established 150 years ago, we were displaced and lost the ability to govern and manage resources within Sohl Temexw. In our Halqemeylem language ‘Letsemot’ references the need to proceed with one heart, one mind, and recognize that all things are connected. Today we are all responsible to work collaboratively to figure out a way forward to make sure that the fish, the water, and resources are going to be here for future generations.”

— Murray Ned, Executive Director, LFFA, PSF Board Member

**451 SALMON POPULATIONS | 4 SALMON PRIORITY WATERSHEDS
20+ HABITAT PRESSURES MAPPED**



Photo by Tavish Campbell

INDIGENOUS-LED SALMON MONITORING FRAMEWORK ESTABLISHED

Working in collaboration with the Central Coast Indigenous Resource Alliance (CCIRA), the Kitasoo/Xai'xais, Nuxalk, Heiltsuk, and Wuikinuxv First Nations, DFO, and regional Charter Patrolmen, the team supported partners in developing a strategic vision for monitoring and stewarding Pacific salmon on the Central Coast of B.C. The report identifies strategies for establishing an Indigenous-led monitoring and stewarding framework — rooted in Indigenous values — for local salmon populations.

“Central Coast First Nations are working to develop capacity to manage their marine resources informed by work such as the Monitoring Framework. 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.”

— Rich Chapple, President, CCIRA

COMMUNITY SALMON PROGRAM

Since 2012, 100 per cent of proceeds generated through sales of the Salmon Conservation Stamp have been directed to PSF by the federal government to support the Community Salmon Program (CSP). CSP supports volunteers, community stewards, and First Nations – People for Salmon – who undertake salmon conservation projects.



Photo by Alanna D

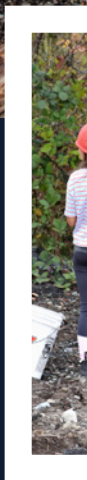
“

It is encouraging working with hundreds of passionate salmon advocates each year. The collective effort of this dedicated stewardship community results in remarkable outcomes for wild Pacific salmon.

”

— Jim Shinkewski, Director, PSF Community Salmon Program

Special thanks to generous donors: Encorp RETURN-IT, Methanex Corporation, Mosaic Forest Management, Neptune Terminals, Pembina Pipeline Corporation, Secure Energy Services, Teck Resources, and The Ultimate Port Alberni Fishing Derby.



**174 PROJECTS | \$1.6+ M GRANTED | \$16.5 M TOTAL VALUE |
237,000 SQUARE METRES HABITAT RESTORED**



GUARDIANS OF MID-ISLAND ESTUARIES

Eco-Cultural Restoration in the K'omoks Estuary is a modification of Indigenous fish weir techniques to restore critical estuary habitat for enhanced salmon survival. Overabundant Canada geese have grazed and denuded estuarine marshes on Vancouver Island for decades, leading to the loss of over 90 per cent of this important juvenile salmon habitat. The Guardians of Mid-Island Estuaries Society have pioneered unique and remarkably effective estuary restoration techniques at six estuaries since 2010.



“Due to intensive plant eating from introduced Canada geese, outside our exclosures can seem like an unvegetated, barren desert. As a wildlife biologist I get such a thrill to see salmonids utilizing the sedge habitat we’ve been able to save and create for them through our unique eco-cultural restoration techniques. Our greatest strength comes from our invaluable collaborations with our First Nations partners. The expertise and enthusiasm they bring to these restoration projects makes the job immensely productive and a lot of fun, too.”

— Garreth Ashley, Field Biologist,
Guardians of Mid-Island
Estuaries Society

\$26,500 GRANTED | \$180,100 TOTAL VALUE | 6 ESTUARIES REPAIRED

COWICHAN ESTUARY NATURE CENTRE

RESTORING RIPARIAN SALMON HABITAT IN THE COWICHAN: YOUTH ENGAGEMENT

With the support of Cowichan Tribes biologists and volunteers from local stewardship groups, salmon stewards are undertaking a multi-year program to improve habitat conditions for coho, chum, and Chinook salmon throughout the Cowichan and Kokisilah watersheds.

**\$8744 GRANTED |
\$65,844 TOTAL VALUE**

"We've been working with the Pacific Salmon Foundation for more than 10 years now. Our work with PSF is so important because the partnership enables us to work with young people to do important riparian restoration work."

— Jane Kilthei, President,
Board of Directors, Cowichan
Estuary Nature Centre

INVASIVE SPECIES COUNCIL OF BC

CITIZEN ENGAGEMENT TO ADDRESS INVASIVE EUROPEAN GREEN CRAB

European green crab are aggressive invasive predators found primarily in eelgrass and kelp — important nearshore juvenile salmon habitat. The crabs damage critical habitat, resulting in loss of prey and diminished survival for salmon. By increasing awareness of this prolific invasive species and developing capacity among the public to report and respond, the destructive impacts on coastal ecosystems and aquatic species can be mitigated.

"We are so excited to have the Trapping and Licencing; European Green Crab eLearning course up and live on the Invasive Species Council of BC's Learning Centre. It means we can empower people to take part in community science trapping initiatives to monitor for this very problematic crab. This has been a great opportunity to work alongside likeminded organizations like the PSF, to help protect B.C.'s biodiversity."

— Nadine McCosker, Learning Manager, ISCBC

\$27,600 GRANTED | \$298,276 TOTAL VALUE | 269 PARTICIPANTS



PERCY WALKUS HATCHERY

At the Percy Walkus Hatchery, People for Salmon work to help Chinook rebound. This hatchery in Rivers Inlet is run by the Wuikinuxv Nation and supported by the Duncanby Lodge & Marina and Good Hope Cannery, DFO, PSF, and many donors. It presents a model to conserve, restore, and enhance unique salmon stocks. The hatchery employs advanced genetic tools and “parental-based tagging” — the gold standard in managing genetic diversity — making it possible to trace the parents of every hatchery fish that returns. Egg-to-fry survival is very high with coded-wire tag returns indicating that enhancement efforts are contributing to increased escapements over time.


It was instilled in me that there should be enough salmon for today but also for those who aren't here yet. Salmon affect all of us and it's important that we have buy-in from sport and commercial fishing, First Nations, industry, and government. If we don't unify on salmon there will be none left.

— Ted Walkus, Hereditary Chief,
Wuikinuxv First Nation

**Special thanks to
generous donors:**

Duncanby Lodge
& Marina, Good
Hope Cannery, and
many individuals.

90%+ EGGS-TO-FRY SURVIVAL | 295,264 CHINOOK FRY RELEASED



CLIMATE ADAPTATION FOR SALMON

Climate change is the greatest threat facing Pacific salmon. In 2021, 150 People for Salmon convened for a workshop to discuss opportunities to moderate and mitigate climate-change effects on salmon.

For example, born from the workshop, the Thermal Refugia for Salmon project tests methods including the use of thermal sensing drones for identifying natural cool water areas for salmon during times of extreme temperatures. Locating areas of cool refuge is challenging as the work often relies on information provided by local swimmers, fisheries professionals, or people in streams. Knowing their locations can allow for better management and protection of habitats.

With the support of BCSRIF, PSF launched the Climate Adaptation Program that prioritizes urgent action in three key areas:

1. ASSESSING FRASER RIVER MIGRATION IMPEDIMENTS

High flows in the Fraser pose migration difficulties for salmon. For example, in 2020, high flows led to salmon being held up for the first several weeks. With the goal of assessing potential impediments including existing fishways, PSF worked with the Matsqui and Yale First Nations to tag and track salmon migration patterns.

2. DEVELOPING IMPROVED GENETIC BASELINES

The program identifies key **genetic** adaptations that could be conserved through hatchery enhancement or habitat restoration to help salmon adjust better to climate change.

3. DEVELOPING A WILDFIRE “PLAYBOOK” TO GUIDE RECOVERY STRATEGIES AND PRIORITIES FOR SALMON

Wildfires lead to major changes in rivers and streams, destroying habitat, salmon, and their eggs. PSF’s fire recovery playbook focuses on the needs of salmon following wildfires and helps the forest industry, government agencies, First Nations, and conservation. Organizations identify impacts and risks. A comprehensive tool to inform priorities and actions, the playbook serves to identify and coordinate opportunities to manage post-fire impacts to salmon habitats, accelerate watershed recovery, and aid future responses.

“There are numerous Chinook and sockeye salmon populations in the Upper Fraser that have been identified by COSEWIC [Committee on the Status of Endangered Wildlife in Canada] as endangered. With these declines come increased health issues and food security issues. Believe it or not, not everyone has the luxury of going to the local grocery store to meet their needs. Community leadership has been forced to impose restrictions, often founded by traditional laws and necessity, on their people in order to preserve the biodiversity of salmon species and stocks that return to the respective territories for future generations.”

— Gord Sterritt, PSF Board Member and Executive Director,
Upper Fraser Fisheries Conservation Alliance, a collaborative
stewardship body for First Nations



Photo by Linda Aylesworth



CLIMATE EMERGENCY

RESPONDING TO SAVE SALMON & THEIR HABITATS

The unprecedented atmospheric river and flooding that occurred in late 2021 required an urgent and coordinated response to save salmon trapped in flooded fields and repair damaged spawning habitat. PSF mobilized partnerships, secured funds, and supported response efforts including:

- **Fraser Valley Salmon Habitat Restoration and Funding:** supported the Sumas Nation and local experts with fish rescue efforts; 18 projects supporting at-risk habitat capable of producing several million juvenile salmon;
- **Reconnected Coldwater River side channels:** the Eaton Beaton side-channel, a tributary to the Nicola River, one of the most important rearing habitats for coho and early-run Chinook, and the most-important for steelhead;
- **Reconstructed Anderson Pond:** supported the reconstruction of a channel in Chilliwack completely buried with sediment; the next day 40 adult coho showed up to spawn.

“These are our most endangered species of coho, so if we can save four females, then we save thousands of eggs.”

— says Lester Ned, Semá:th First Nation, after rescuing salmon in Abbotsford B.C.

Special thanks to Pacific Salmon Endowment Fund Society, Pacific Angler and Groupe Ocean for their generous support.

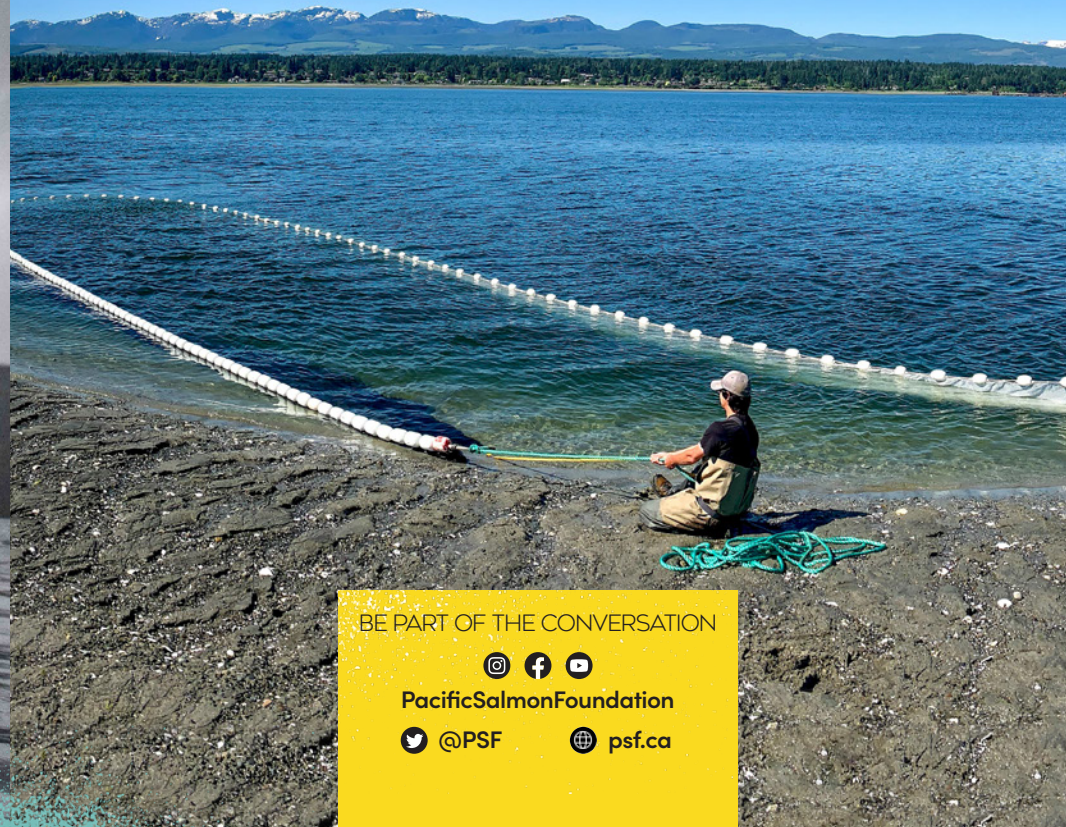
**\$350,000 EMERGENCY FUNDING |
25 EMERGENCY RESTORATION PROJECTS**

“Many salmon populations have experienced major declines, and 2021 showed us how climate change is bringing additional challenges. However, with our help, these resilient fish can recover. We have a responsibility to help turn things around. The PSF team, along with the work of our partners and supporters, is helping to make things better, contributing towards healthy and sustainable salmon populations for future generations.”

—Jason Hwang, VP Salmon, PSF



SPECIAL THANKS
TO OUR GENEROUS SUPPORTERS
FOR ADVANCING GAME-CHANGING WORK
TO SAVE AND RESTORE WILD PACIFIC SALMON.



BE PART OF THE CONVERSATION



PacificSalmonFoundation

