



Photo: Eiko Jones • Coho Salmon Par (*Oncorhynchus kisutch*)

Wild Salmon Policy



Fisheries and Oceans Canada | Pacific Region
2018–2022 IMPLEMENTATION PLAN



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada



Message | From the Minister

As Canada's Minister of Fisheries and Oceans and the Canadian Coast Guard, it is my pleasure to present the *Wild Salmon Policy 2018–2022 Implementation Plan*. This Plan does not focus on actions taken, but rather represents Canada's plan forward and commitment over the next five years towards continuing to restore and maintain wild Pacific salmon populations and their habitats.

When *Canada's Policy for Conservation of Wild Pacific Salmon* was released in 2005, it was considered a ground-breaking document developed over five years of consultations with Canadians. It put a new priority on conserving the rich biological diversity of Pacific salmon, while supporting the sustainable use of one of Canada's cherished natural resources – wild Pacific salmon.

Thirteen years later, salmon science and conservation work has been advanced, the goals and objectives of the policy remain pertinent, and the passion of Canadians is stronger than ever. The need to increase focus on this important keystone species continues as we face changing ocean and freshwater habitat conditions, less predictable returns and declines in some stocks.

We must find ways to continue to safeguard the genetic diversity of wild salmon and maintain habitat and ecosystem integrity; this is critical to both ensuring their conservation and continuing to provide opportunities for economic benefits that Pacific salmon generates for many Canadians – including BC and Yukon First Nations, commercial and recreational fishers and many small communities. I am committed to working with the BC and Yukon governments to enhance and deepen our collaboration going forward to protect Pacific salmon and salmon habitat.

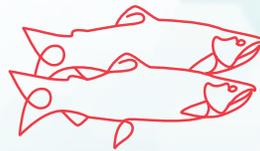
I would like to thank the hundreds of dedicated Canadians who participated in our consultations in 2016 and 2017 and who provided valuable feedback in person or in writing. Fisheries and Oceans Canada has listened to the comments and considered all the recommendations in building this Plan. My Department is fully committed to the Pacific Wild Salmon Policy and I am confident that by working with our dedicated partners, including collaboration with the Government of BC and First Nations on an integrated strategy, we will secure a brighter future for wild Pacific salmon.

A handwritten signature in blue ink that reads "Jonathan Wilkinson". The signature is fluid and cursive, written in a professional style.

The Goal of Canada's Wild Salmon Policy (WSP)

« To restore and maintain healthy and diverse salmon populations and their habitats »
for the benefit and enjoyment of the people of Canada in perpetuity.

WSP, 2005, P. 8



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WSP Implementation Plan

This Plan describes Fisheries and Oceans Canada’s commitment to *Canada’s Policy for Conservation of Pacific Wild Salmon* (Wild Salmon Policy or WSP) through three key themes: Assessment, Maintaining and Rebuilding Stocks, and Accountability. Over the next five years, DFO will develop common guidance, standardized methods, and useful tools to advance the long-term goal and objectives of the WSP.

Introduction | Three Interrelated Themes

The WSP lays out six strategies to restore and maintain healthy and diverse salmon populations and habitats, which can be grouped into three interrelated themes: Assessment, Maintaining and Rebuilding Stocks, and Accountability.

The Assessment theme (WSP Strategies 1, 2 & 3) reflects the interconnectedness between Conservation Unit (CU) assessment and habitat and ecosystem impacts, including assessment and monitoring of salmon, their habitats and ecosystems. Assessment work is the foundation of successful management and is a critical first-step in integrated planning. By its nature, assessment work takes stock of what has happened, and typifies the broader Government of Canada’s commitment to strengthening the role of science in government decision-making.

The Maintaining and Rebuilding Stocks theme (WSP Strategies 4 & 5) details work around progressive and integrated planning and annual program delivery, including how information from assessment activities can be used to manage, maintain and rebuild stocks and habitat. Planning activities are forward looking, and are adaptable to evolving conservation requirements.

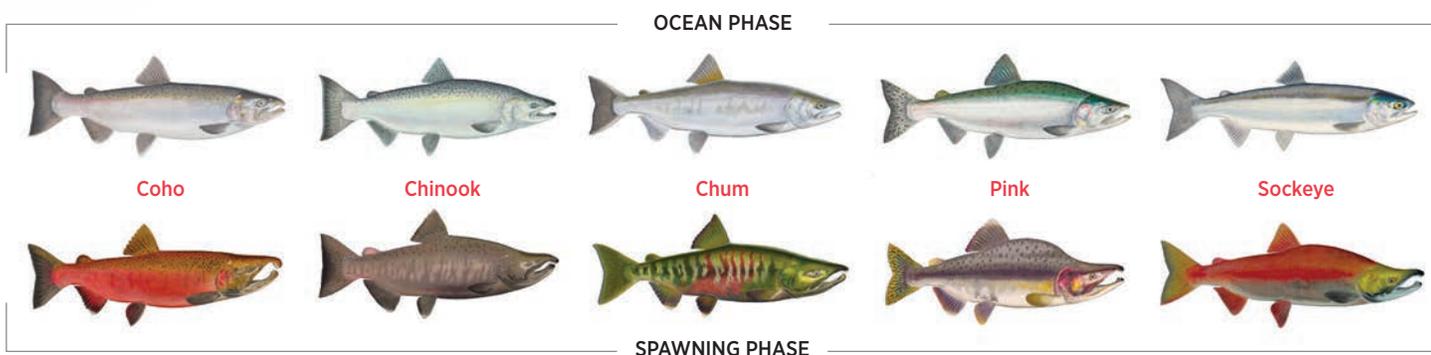
The final theme of Accountability (WSP Strategy 6) commits DFO to completing activities and reporting publically on progress to ensure that activities and governance structures in this Plan are operationalized and effective. This reflection will enable DFO to adjust activities to better satisfy the WSP goal through time.

Wild Pacific Salmon

Pacific salmon are considered “wild” if they have spent their entire life cycle in the wild and originate from parents that have continuously lived in the wild and were also produced by natural spawning.

The WSP addresses 5 species of wild Pacific salmon:

O. kisutch (Coho), *O. tshawytscha* (Chinook), *O. keta* (Chum), *O. gorbuscha* (Pink), and *O. nerka* (Sockeye). These species form part of the larger classification of Pacific salmonids, which includes *O. mykiss* (Steelhead Trout – the anadromous form of Rainbow Trout) and *O. clarkii* (Cutthroat Trout).



Salmon | An Iconic and Complex Species

Canadians have an enduring connection with Pacific salmon. Their journey home to streams and rivers is a symbol of struggle, renewal, and adaptation. Wild salmon hold tremendous value for natural ecosystems, cultural and spiritual practices, jobs and income, and recreational enjoyment along the coast and inland watersheds of the Pacific Region. They are important for Indigenous people, communities, individuals, groups and businesses across BC and Yukon.

Salmon are a keystone species in marine, freshwater, and terrestrial ecosystems. Many species of fauna and flora – from orcas to black bears to Douglas fir – depend on migrating salmon, as returning adults carry rich ocean nutrients back to spawning grounds. Salmon are also inextricably linked to Indigenous communities, not only as a traditional food source, but also as a vital component of their nutritional, spiritual, cultural, social and economic wellbeing. Finally, wild Pacific salmon support commercial and recreational fisheries that are a foundational part of

the socio-economic fabric of the Pacific region. The business stemming from fishing activity – including fish processing, fish guiding, tackle shops, hotels, ecotourism, and restaurants, to name a few – ripple through the economy, creating additional jobs and income.

However, salmon management is complicated, in part because Pacific salmon have complex life histories that take some of them over thousands of kilometres from California to Alaska. Salmon hatch and rear in freshwater streams, rivers, lakes, and estuaries, and then mature into adults in the ocean environment, before finally returning at the end of their lifecycle to their natal freshwater spawning grounds.

Over the course of this migration, Pacific salmon populations are influenced by wide-ranging natural and human-made environmental pressures, resulting from decisions made by different parties, including international, federal, provincial/territorial, regional, and Indigenous (see Wild Salmon and Ecosystems Governance in British Columbia and Yukon on page 3).

Wild Salmon and Ecosystems Governance in British Columbia and Yukon



INTERNATIONAL

UN Declaration on the Rights of Indigenous Peoples
 Pacific Salmon Treaty
 Paris Climate Agreement



TERRESTRIAL & FRESHWATER



Constitution Act, s. 35
Fisheries Act
Species at Risk Act
Canadian Environmental Assessment Act
Canadian Environmental Protection Act
Yukon Environmental & Socio-Economic Assessment Act
Canada Water Act



Comprehensive Claims & Other Agreements
 Indigenous Laws
 Yukon First Nations
 Final Agreements



Water Sustainability Act
Forest and Range Practices Act
Oil and Gas Activities Act
Mines Act
Land Act
Environmental Assessment Act
Environmental Management Act
Riparian Areas Protection Act
Agricultural Land Commission Act



Environment Act
Forest Resources Act
 Yukon Fish and Wildlife Management Board-Yukon
 Salmon Sub-Committee Recommendations
Waters Act



Zoning & Permits; Bylaws

FORESHORE



Constitution Act, s. 35
Fisheries Act
Species at Risk Act
Canada Shipping Act
Canada Marine Act
Canadian Environmental Assessment Act
Canadian Environmental Protection Act
Oceans Act
National Marine Conservation Areas Act
 Pacific Aquaculture Regulations
Yukon Environmental & Socio-Economic Assessment Act



Comprehensive Claims & Other Agreements
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Riparian Area Protection Act
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Zoning & Permits; Bylaws

MARINE



Constitution Act, s. 35
Fisheries Act
Species at Risk Act
Canada Shipping Act
Canada Marine Act
Oceans Act
National Marine Conservation Areas Act
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Comprehensive Claims & Other Agreements
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 Yukon First Nations
 Final Agreements



Water Sustainability Act
Environmental Management Act
Environmental Assessment Act



Yukon Fish and Wildlife Management Board –
 Yukon Salmon Sub-Committee Recommendations



FEDERAL



INDIGENOUS



PROVINCIAL



TERRITORIAL



LOCAL



198

Number of First Nations in BC and Yukon who have access to Pacific salmon.

Salmon Governance | Jurisdictional Authority

DFO's work should be considered in tandem with all the important work being undertaken by First Nations, federal and provincial government agencies, fishing and stewardship organizations, Environmental Non-Governmental Organizations (ENGOS), and communities across the region who share a commitment to conserve and protect wild Pacific salmon, their habitats, and ecosystems.

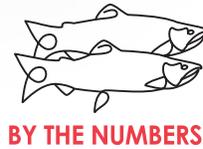
Cross-jurisdictional federal, provincial/territorial, local and Indigenous partnerships are essential ingredients to an integrated approach to salmon management. While this Plan focuses on DFO's work under the three themes (Assessment, Maintaining and Rebuilding Stocks, and Accountability), the jurisdictional framework includes separate legislated authorities for habitat management, integrated resource management, and land protection, as well as local management plans and zoning. DFO's work should therefore be considered in tandem with all the important work being undertaken by First Nations, federal and provincial government agencies, fishing and stewardship organizations, ENGOS, and communities across the region who share a commitment to conserve and protect wild Pacific salmon, their habitats, and ecosystems.

This document reflects the federal government's commitments to the United Nations Declaration on the Rights of Indigenous Peoples, Section 35 of the *Constitution Act, 1982*, and the Principles Respecting the Government's Relationship with Indigenous Peoples. Reconciliation and a renewed Crown-Indigenous relationship require an ongoing commitment to collaborative approaches and new ways of working together. This means DFO working

in partnership with Indigenous peoples, cooperating with Provincial and Territorial governments, and engaging stakeholders and all Canadians.

Fisheries and Oceans Canada recognizes that Indigenous peoples have a unique and important knowledge about Pacific salmon, how the local environment functions, and characteristic ecological relationships. An important aspect of the proposed (2018) changes to the *Fisheries Act* formalizes consideration of Indigenous knowledge in decision-making.

DFO is committed to continuing to incorporate the knowledge and experiences of Indigenous peoples – or Indigenous Knowledge Systems (IKS) (partially covered by the term Aboriginal Traditional Knowledge in the 2005 WSP) – into its delivery of activities both at the project level and at a larger scale. In the context of the WSP Implementation Plan, IKS refers to the use of accumulated knowledge about Pacific salmon, salmon-dependent species, and salmon habitats and environments. A holistic definition could include both modern ways of knowing (e.g. science) and traditional knowledge that has accumulated over many generations. Ultimately, however, IKS needs to be defined by the Indigenous groups who hold the knowledge.



5

Number of salmon species addressed in Canada's Wild Salmon Policy.

WSP Delivery | Activities and Accountability

Over the last 13 years, the Department has advanced WSP work. DFO's focus initially has been on the development of technical methods and tools to support the assessment of salmon conservation units, modest initiatives to assess habitat and ecosystems, and day-to-day fisheries and ecosystems management decisions within regional programs that reflect the principles, goal, and objectives of the WSP.

The Department continues to recognize that the goal of the WSP cannot be achieved by DFO alone. By focusing over the next five years on activities that standardize methods, and by building a framework for the delivery of the WSP, the Department will be able to better support partnerships and communities as we

collectively work to maintain and rebuild Pacific salmon populations and their habitats.

To ensure that this work is being done, activities will be reviewed annually, with a full review of this Plan to be undertaken at the end of the five-year period. Further, it is expected that the Plan will be reviewed and updated in 2020 to include additional activities that result from new programming under a renewed *Fisheries Act*.

While the goal and objectives of the WSP (see Annex 2) serve as a key guide towards salmon-related work in the Pacific Region, over the next five years the Department will also use nine overall approaches as outlined below, along with 48 more specific activities, as outlined at the end of each WSP strategy.

Approaches in Support of the WSP

ID	Overarching Approaches
A	Engage BC and Yukon First Nations, partners, and stakeholders at the local level to leverage IKS and local expertise to gain understanding of habitat status and other factors limiting production
B	Support First Nations' salmon governance processes and capacity aimed at facilitating collaboration
C	Consider WSP guiding principles and objectives in ongoing management and program activities, both internally and with partners
D	Consider WSP guiding principles and objectives in annual and multi-year work planning processes
E	Adapt and update best practices based on lessons learned
F	Continue integrated planning discussions through various mechanisms, including local roundtables
G	Consider WSP activities in the <i>Species at Risk Act</i> (SARA) listing process for any wild salmon species
H	Work on an integrated approach to wild salmon with the Province of BC
I	Continue engagement with Yukon First Nations Governments and the Yukon Salmon Sub-Committee to further salmon work in Yukon



Photo: Eiko Jones • Spawning Pink Salmon (*Oncorhynchus gorbuscha*)

Strategy 1 | Standardized Monitoring of Wild Salmon Status

To understand the current status of wild salmon stocks, it is important to have regular, standardized science-based monitoring to: 1) identify benchmarks for CUs in three status zones – Green, Amber, Red; 2) determine the current status zone for the CUs; and 3) continue to monitor and assess status of CUs.

Priorities to 2022

- Implement prioritization method for assessing and monitoring CUs or groups of CUs
- Modify or develop metrics and document new status assessment methods
- Consolidate and improve documentation of standards for internal and external monitoring programs and improve data sharing through open data portal

CUs are the fundamental unit of Pacific salmon biodiversity. They consist of one or more genetically similar populations with a defined geographic distribution and dependence on a particular set of habitats. They are identified based on genetic traits, biogeographic distribution, life-history characteristics, and local knowledge (e.g. IKS, see p. 4), where available.

Within the Department, CU identification and assessment work is undertaken by the Science Branch in collaboration with others. The information is used by Fisheries Management and Ecosystem Management to inform Integrated Fisheries Management Plans (IFMPs), in-season fisheries management decisions, enhancement activities, and other day-to-day decisions that act to protect and restore wild salmon. This includes possible remediation measures to reduce habitat and ecosystem impacts on productivity.

The Department has developed a toolkit of metrics to determine CU status which includes four classes of indicators: 1) abundance, 2) trends in abundance, 3) distribution of spawning, and 4) fishing mortality (Holt et al., 2009). Using a systematic approach that integrates the range of information across these four classes of indicators (Grant and Pestal, 2013), benchmarks can be identified and status can be quantified for a CU.

Benchmarks identify when the biological production status of a CU has changed significantly.

The lower benchmark (between the Red and Amber zones) is established at a high enough level of abundance to provide a substantial buffer between it and any level where a CU would be considered at risk of extinction by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The higher benchmark (between the Amber and

Conservation Unit (CU)

A group of wild salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to re-establish naturally within an acceptable time frame, such as a human lifetime or a specified number of salmon generations (WSP, 2005, p. 10). The delineation of CUs relies on genetic traits, biogeographic distribution, life-history characteristics, and local knowledge (e.g. IKS), where available.

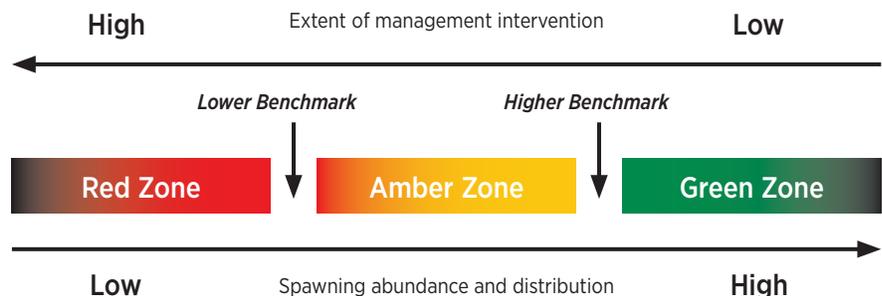
Green Zones) is established to identify whether harvests are greater or less than the level expected to provide (on an average annual basis), the maximum annual catch for a CU, given existing environmental conditions. This level will vary through time, but there is not a high probability of losing the CU (WSP, 2005, p. 18).

The delineation of CUs and their benchmarks do not prescribe specific management actions, but are used to inform decision-making. As spawner abundance decreases, a CU moves towards the lower status zone and the extent of management intervention for conservation purposes increases. A CU in the Red Zone is undesirable because of the risk of extirpation, and the loss of ecological benefits and salmon production. Changes in status will trigger management actions that will vary depending on species, geographic regions, and cause of the decline.

Using a methodology developed to identify the diversity of wild salmon for the five Pacific salmon species (Holtby and Ciruna, 2007), over the last 13 years DFO has identified 463 CUs (more than triple the number of CUs originally thought to exist in 2005!). CU numbers and boundaries will evolve as new information becomes available.

CU Benchmarks

Benchmarks identify biological production status and are used for management and conservation decisions.



Assessing Salmon Status | Metrics and Monitoring

CU Biological Status Assessment

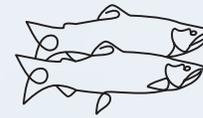
CU biological status assessment can be difficult, especially if collection of data for a particular CU utilizes different methods or consistency. To accommodate these differences, the data must be processed in various ways to ensure that uncertainties in abundances are adequately captured and biases are not introduced.

Understanding the capacity of a system to produce salmon returns requires either long-time series of spawner and adult return abundances, or independent estimates of production potential, such as from watershed characteristics. When data are lacking, proxy approaches are required.

When the individual metrics are applied to assess status for a given CU, each class of indicator may quantify status in a different zone. For several metrics, a pair of benchmarks have been identified that may be common across all CUs (e.g. for trends in abundance metrics), although the exact values may differ (e.g. for abundance metrics).

A CU's initial assessment requires significant work and input, with subsequent re-evaluations becoming less labour-intensive. The initial assessment typically involves a workshop where experts discuss the results for the various metrics, determine the CU's status, and document the factors that led to the particular status designation.

Peer review of CUs grouped by species and watershed occurs through the Canadian Scientific Advisory Secretariat (CSAS), which ensures open, transparent and sound scientific advice.



BY THE NUMBERS

463

The current number of CUs defined for five species of Pacific salmon based on ecological, genetic and life history characteristics.

Chinook	84
Chum	47
Coho	44
Pink	33
Sockeye	255

Sockeye Salmon CUs (255) exceed the total for all other species combined (208), due to the largely lake-based spawning and rearing habitats utilized by Sockeye Salmon and the genetic isolation/uniqueness that results from this life history.

What Is An Official Assessment According to DFO?

Designed to meet the goal of delivering sound scientific advice, the CSAS open review process is time and resource intensive.

There are multiple assessment methods which can offer useful information and insights on the status of salmon, including peer reviewed biological status assessments. However, only those assessments that undergo formal peer review through the CSAS process are considered official advice by the Department. CSAS undertakes an open and transparent review of datasets, methods and benchmarks to meet the goal of delivering sound scientific advice. Participant consensus on the integrated status for each CU under consideration is an important outcome of this process, which results in the online publication of official integrated status documents. Although the CSAS process can be quite lengthy and is time and resource intensive, a key benefit of this approach is that decisions on integrated status designation for each CU assessed are accompanied by detailed "status commentaries". These commentaries capture the expert interpretation of the available data, and detail the rationale underlying final status decisions.

Intensive vs. Extensive Monitoring

Salmon data can draw on both a select number of intensively monitored sites, where more accurate and precise estimates of escapement, catch, and stock-recruitment are obtained; and extensively monitored sites, where escapements are monitored at a coarser level with lower precision and accuracy, but over a much broader geographic area. Information collected from intensively monitored sites may also include data on returning adult salmon (age, sex, DNA, etc.), and on fry and juvenile fish. Both are necessary for a robust, cost-effective system.

Open Data

Once a CU is identified, it is included in the New Salmon Escapement Database System (NuSEDS), which holds data on adult salmon escapement. CUs are monitored (including monitoring escapement and catch, stock identification, sex, age, spawning success, and the fecundity of spawners) and reassessed as appropriate.

Strategy 1: WSP Activities 2018–2022

Action Step	Activity ID	Activity	Lead DFO Sector/Program	Target Completion
1.1 Identify CUs	1	Maintain an authoritative database of CU descriptions, including biological and geographical attributes, and make it available to the public via the Government of Canada's Open Data portal	Science–StAR	March 31, 2019
1.1	2	Develop a framework for reviewing and approving revisions to CU descriptions	Science–StAR	March 31, 2020
1.2 Develop criteria to assess CUs and identify benchmarks for biological status	3	Modify existing metrics or develop new metrics to address CUs that cannot be assessed with existing status assessment tools and subject modifications to CSAS review process	Science, StAR	Ongoing, as required
1.2	4	Document new methods for status assessments of CUs or groups of CUs and conduct peer review through CSAS	Science–ESD, StAR	Ongoing, as required
1.2	5	Develop a strategy to improve documentation of standards for data, methods, and reporting of monitoring programs	Science–ESD, StAR	March 31, 2022
1.3 Monitor and assess status of CUs	6	Apply and refine an approach for identifying and prioritizing CUs or groups of CUs for biological status assessments	Science–StAR Fisheries Management–SMCS	March 31, 2020
1.3	7	Continue to monitor CUs on a priority basis using indicator, intensive, and extensive monitoring approaches	Science–StAR	Ongoing
1.3	8	Update NuSEDS database of spawner abundances linked to CUs and publish via the Open Data portal	Science–StAR	Annually, March 31
1.3	9	Integrate research on the abundance, health, and condition of Fraser Sockeye during their migration in the marine environment from the mouth of the Fraser River through Johnstone Strait	Science–ESD, ADGT, StAR	March 31, 2022
1.3	10	Work with PSF to enable better data transfer, availability and delivery	Science–StAR	Ongoing

Strategies 2 & 3

Assessment of Habitat Status and Inclusion of Ecosystem Values & Monitoring

In order to be effective, habitat and ecosystem assessment and sustainable management require an integrated approach; thus Strategy 2 and Strategy 3 are considered together.

Priorities to 2022

- Identify a set of core environmental indicators associated with ecosystems
- Complete documentation on the Risk Assessment Method for Salmon (RAMS)
- Deliver the State of the Salmon Program to track and understand salmon trends
- Work with the Pacific Salmon Foundation on the Pacific Salmon Explorer



10,000+

Number of volunteers involved in restoration and enhancement activities.

WSP and Our Partners | Pacific Salmon Explorer

The Pacific Salmon Foundation (PSF) has been partnering with federal and provincial government agencies, Indigenous communities, academic institutions, regional experts and other NGOs to compile and synthesize the best available information for salmon CUs in the Pacific Region. Starting with BC's north and central coast, PSF has been applying methods consistent with Strategies 1 and 2 of the WSP to assess the biological status of salmon CUs and pressures on their freshwater habitat.

This information is displayed in an online data visualization tool: the Pacific Salmon Explorer or PSE (www.salmonexplorer.ca). This innovative tool provides a comprehensive snapshot



Visit: salmonexplorer.ca

of individual salmon CUs, including information on salmon abundance, trends over time, productivity, run timing, estimates of biological status, and assessments of individual and

cumulative pressures on salmon habitat. Users can print summary reports for individual CUs, download source datasets, and access timely information on salmon populations and their freshwater habitat.

Through a number of contributions including \$1.2 million from Canada's Coastal Restoration Fund (CRF), the PSF is expanding the PSE to provide information on salmon CUs for the south coast including Vancouver Island and the Fraser River watershed. The PSE will help to determine priority areas for coastal restoration projects, and provide support for the development of strategies for mitigating key threats and pressures that may be hindering the recovery of important salmon populations.

Risk Assessment Toolkit

There are two key separate tools in the risk assessment toolkit. The Risk Assessment Method for Salmon (RAMS) is focused on environmental risk assessment and leans heavily on salmon life history and environmental information, whereas risk assessment used in stock assessment is a wider ranging “filter” that considers socio-economic, cultural, legal and political factors as the context for risk. Each has merit as a risk assessment procedure.

Freshwater and marine habitats are vital to different life stages of salmon. During spawning, feeding, rearing and migration, salmon spend time in rivers, lakes, and near-shore coastal areas. In contrast, during adult stages, salmon spend time in the open ocean before returning to freshwater to spawn. Different salmon populations spend varying amounts of time in each of these habitats.

Natural and human-induced changes to these habitats (e.g. drought, flood, forest cover removal, mining operations, water withdrawal, run-off pollution, climate change impacts) can alter the ecology of freshwater systems, including changes to nutrient flow, food availability, and water temperatures. These changes affect salmon health, although due to the variations in time spent in each habitat, salmon populations will be impacted differently. Throughout their life histories, there may also be cumulative impacts across the range of habitats that will affect salmon population health. (For a conceptual overview of ecosystem drivers that impact salmon populations see Natural and Human-induced Pressures on Salmon Habitat on page 13).

To assess freshwater habitats (streams, lakes and estuaries), DFO has identified a preliminary suite of indicators, and related benchmarks and metrics (Stahlberg et al. 2009). These include physical and chemical indicators designed to measure the quantity of habitat (e.g. stream length, lakeshore spawning area), its state or condition (e.g. water temperature and quality, estuary contaminants), and habitat pressure from land and water uses (e.g. road development, water extraction). These indicators have been tested at

different levels of assessment, from overview analyses of the habitat pressures in CU watersheds, to more detailed reports examining highly productive or limiting habitats, and threats to them.

Recent research suggests different salmon populations behave similarly when faced with the same broad scale habitat pressures. As a result, assessment of data rich salmon habitats and ecosystems, particularly freshwater environments, can be applied to groups of salmon CUs in the same habitat area (e.g. at the level of watersheds).

The Risk Assessment Method for Salmon (RAMS) process helps identify management interventions to conserve, restore or enhance salmon CUs of interest within a broader ecosystem or applied Management Unit (MU) context (Hyatt, Pearsall and Luedke, 2017). This methodology has been adapted from a framework on Ecological Risk Assessment for the Effects of Fishing initially developed to inform an ecosystem-based approach to fisheries management in Australia (Hobday et al., 2011). Pilot testing of RAMS in several workshops has allowed DFO to provide an evidence-based diagnosis of factors driving state changes for populations or CUs of interest, as well as to identify management intervention actions that may be effective in avoiding, stabilizing or (less commonly), reversing a decline. The RAMS methodology can be applied at whatever scale (CU, group of CUs, streams, watershed, river basins, or eco-regions) wild salmon populations warrant by their underlying genetic and eco-typic structure.

Research is also ongoing to better understand marine and freshwater ecosystems, including the impacts of climate change and oceanic conditions on salmon survival. Oceanographically, the Pacific coast of Canada is a transition zone between coastal upwelling (California Current) and downwelling (Alaskan Coastal Current) regions. There is strong seasonality, considerable freshwater influence, and added variability originating from conditions in the tropical south and temperate North Pacific Ocean. The region supports ecologically and economically important resident and migratory populations of invertebrates, groundfish, pelagic fishes, marine mammals and seabirds. Since 1999, an annual State of the Pacific Ocean meeting has

been held by DFO scientists to present the results of the most recent year's monitoring efforts in the context of previous observations and expected future conditions. Information on the impact of climate and oceanographic conditions on Pacific salmon and other marine species is provided in Canada's State of the Ocean reporting.

Monitoring of oceanographic conditions and fishery resources of the Pacific Region is undertaken by a number of government departments to better understand the natural variability of these ecosystems and how they respond to both natural and anthropogenic stresses.

Ecosystem-habitat protection and restoration is not solely the responsibility of DFO, but is shared amongst other levels of government through partnerships and collaborative work. For example, BC's Ministry of Environment and Climate Change

Strategy undertakes major aquatic ecosystem and landscape inventory assessments as part of their mandate. By its nature, ecosystem monitoring requires collaboration amongst a number of entities who may be collecting and monitoring data for various purposes and at various scales.

DFO's Pacific State of the Salmon Program was initiated in March 2017, with the goal of tracking and comparing Canadian Pacific salmon population trends, and understanding their contributing factors, through communication and collaboration. This Program delivers presentations and publications in a variety of forums; pre-season, in-season, and post-season reporting on salmon returns, escapements, and survival; and an annual State of Salmon forum to foster collaboration among experts on salmon and their ecosystems.

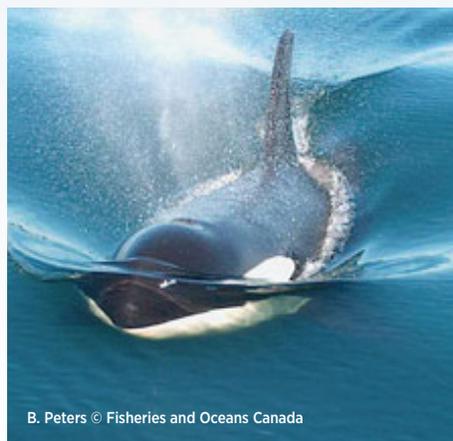
Ecosystem Values | Restoring Chinook to Protect Killer Whales

Chinook Salmon are the primary prey species for Southern and Northern Resident Killer Whales (RKWs), although Chum Salmon are seasonally important. Their availability is one of the critical factors in supporting RKW recovery, and will feature prominently in the work of DFO and others to help protect RKWs.

BC's RKWs are iconic creatures that are cherished by British Columbians, Canadians and visitors alike, and hold significant cultural value for Indigenous peoples along the BC coast; however, Northern RKWs are listed as Threatened and Southern RKWs as Endangered under SARA. Further, Southern RKWs are in decline, with the number at about 75 individual animals as of 2018. Populations of Southern BC Chinook Salmon have also declined dramatically in recent years. Helping to restore Chinook populations and enhance the availability of Chinook as prey are important elements of the broader response locally, regionally, nationally and in partnership with the Washington State government and groups in the US, to protect and foster the recovery of RKWs.

In May 2018, the Government of Canada

announced further action to protect BC's SRKW, including measures announced by the Minister of Fisheries, Oceans and the Canadian Coast Guard related to Chinook Salmon populations. Reductions in coast-wide salmon harvests are being im-



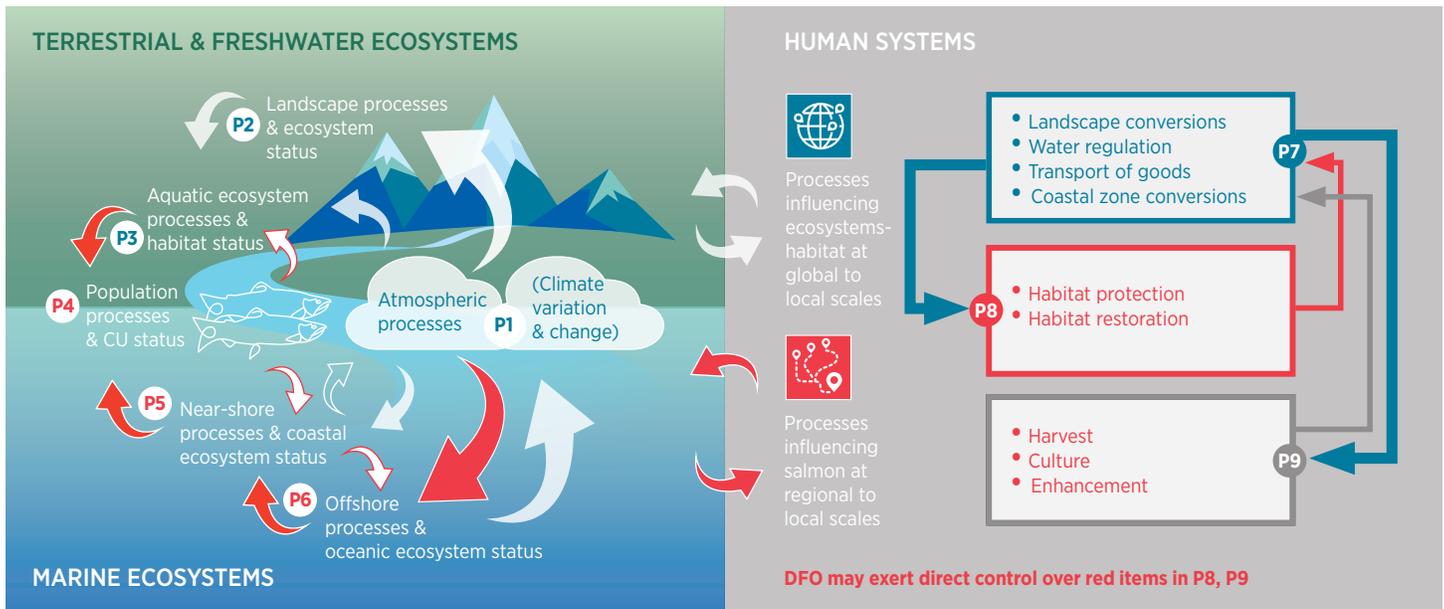
B. Peters © Fisheries and Oceans Canada

Chinook Salmon recovery will feature prominently in the work of DFO and others to help protect Resident Killer Whales.

plemented to conserve stocks of Southern BC Chinook and Southern RKW Management Areas are being piloted in 2018 in the Salish Sea to improve prey availability and avoid acoustic and physical disturbance in key areas. Targeted Chinook/Southern RKW assessment work and scientific research will increase our understanding of the seasonal distribution and prey requirements of RKWs and monitor the outcomes of the Chinook fisheries closures to inform future actions.

Work continues on implementing high priority management and research-based measures identified in the SARA Action Plan for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada. DFO work includes: increasing prey availability through management of fisheries and conservation of freshwater habitat; evaluating the potential impacts of disturbance and prey competition from fisheries on foraging success in key foraging areas; identifying features that define "quality" prey for RKWs (e.g. length, age, caloric value, lipid content, contaminant load); and identifying potential additional areas of Critical Habitat.

Natural and Human-induced Pressures on Salmon Habitat



DFO is principally responsible for dealing with P3, P4, P5, P6, P8, P9 Other agencies are responsible for P1 (Environment Canada), P2, P3, P7 (Province of BC, FLNRO)

The Pacific State of the Salmon Program relies on an analytical tool built for scientists and managers to answer key questions that support their research, monitoring and management activities. This purpose-built tool enables users to actively investigate and interact with data across Pacific salmon populations to identify common trends, overarching patterns, and relationships amongst populations. Key salmon datasets accessible within the tool will include abundance, productivity, body size, fecundity, and status, where available.

The tool provides a gateway and outlet for collaborating with experts, both within and outside of DFO, on salmon and their ecosystems. It will also enable broad public communication on observed patterns across salmon populations, their relationship to one another, their ecosystems, and other contributing factors.

Moving forward with a focus on ecosystems will require consideration of the cumulative effects on salmon. The Province has acknowledged the need to measure effects of natural resource activities and has developed a cumulative effects framework

and associated interim policy aimed at consistently and transparently assessing and managing cumulative effects across BC's natural resource sector. Funded by the Pacific Salmon Commission and the Natural Sciences and Engineering Research Council, research projects into specific cumulative effects modeling approaches for salmon were completed. DFO will continue to work on collaborative research relevant to salmon health.

Habitat Report Cards

Report cards draw on habitat characteristics, pressure and state indicators (Stalberg et al., 2009), vulnerability indicators at different life-history stages, and benchmarks to provide a snapshot of the current risks to salmon habitats in a watershed. DFO has completed report cards on freshwater spawning and rearing habitat status for 35 Southern BC Chinook CUs, and the Pacific Salmon Foundation has prepared regional-scale habitat report cards for salmon CUs in the Skeena and Nass River watersheds and the Central Coast.

WSP and Our Partners | Habitat Restoration

To ensure projects are integrated into local and area plans, watershed planning is collaboratively undertaken with community partners.

SEP Resource Restoration Unit

Restoring and improving fish habitat critical to the survival of wild salmon stocks is an important focus of the Resource Restoration Unit. This work can include building side-channels, improving water flows, stabilizing stream banks, rebuilding estuary marshes, removing barriers to fish migration and planting stream-side vegetation. Watershed planning is undertaken with community partners to ensure projects are integrated into local and area plans.

To support community, corporate and Indigenous partners in this work, the Resource Restoration Teams collaboratively undertake activities. These include: watershed planning processes, construction of new restoration projects, inspections and maintenance of existing works and projects, biological and physical monitoring, technical support and review, partnerships and education, and advice to funding programs.

Habitat Stewardship: Two Examples

The Cowichan Stewardship Roundtable coordinated a major habitat restoration project in 2006 to stabilize the Stoltz Bluff, which was releasing large amounts of sediment into the Cowichan River. Erosion had destroyed critical fish habitat and spawning grounds, threatening the survival of local Chum, Coho, and Chinook Salmon and Steelhead Trout. The project required the temporary diversion of a one-kilometer stretch of the river and the capture and relocation of 30,000 fish while a berm structure was installed to protect the clay bluffs from ongoing erosion. The results were a measureable decrease in suspended sediment, leading to improved water quality, biological productivity and salmon returns.

Cougar Creek Streamkeepers To reduce pollution from stormwater discharges, the Cougar Creek Streamkeepers have championed the construction of rain gardens in North Delta. Built and maintained by the municipality, Cougar Creek Streamkeepers, schoolchildren and volunteers, these gardens filter and recycle rooftop and parking lot rainwater.

Projects that help to restore coastal aquatic habitats will receive \$75 million in funding support nationally from the Coastal Restoration Fund (CRF).

Coastal Restoration Fund

Launched in November 2016 under the national Oceans Protection Plan (OPP), the fund supports projects through to 2022 on all Canadian coasts, with preference given to projects that are multi-year and multi-party, including Indigenous groups. Many of the approved Pacific projects have direct linkages to wild salmon and to the restoration of wild salmon habitat. Some Pacific Region examples include:

\$2.6 million to Cowichan Tribes: 5-year project involving multiple restoration projects in the Cowichan and Koksilah Rivers, Cowichan Lake and associated lake tributaries. The project aims to restore critical habitat for Chinook Salmon by re-establishing the connection between the two rivers' estuaries, improving

riparian areas, enhancing water quality and by rebuilding the health of the watershed more generally.

\$1.3 million to the Salish Sea Near-shore Habitat Recovery Project: 5-year project coordinated by SeaChange Marine Conservation Society to increase resiliency of near-shore intertidal and subtidal habitats by identifying and restoring critical habitat for forage fish and juvenile salmonids within four primary areas of the Salish Sea—Howe Sound, Gulf Islands, Sechelt and Burrard Inlet. SeaChange will convene a technical working group and through engagement with local First Nations and other community members, will identify potential restoration sites and carry out restoration activities.

\$1.5 million to the Squamish River Watershed Society: 5-year project aimed at restoring coastal habitat in the Squamish River Estuary. The Squamish Nation, Squamish Terminals and the District of Squamish will collaborate to re-establish freshwater connection to the estuary in order to facilitate the recovery of Squamish River Chinook Salmon.

\$875,000 to the North Coast Skeena First Nations Stewardship Society: 5-year project to carry out habitat restoration projects for Sockeye, Chinook and Chum Salmon in the lower Skeena River and estuary. In addition to the aim of restoring native salmon populations, this project aims to improve local First Nations' access to Skeena salmon for food, social and ceremonial purposes.

Jurisdictions Around Habitat

Federal Government

The federal government has responsibilities for habitat protection and restoration through the *Fisheries Act*, 2012, and the *Oceans Act*, 1996. The *Fisheries Act* provides broad, overarching authority to federal departments (including DFO and Environment and Climate Change Canada) to protect fish and fish habitat including regulatory and pollution prevention provisions. The *Oceans Act* provides broad, overarching regulatory authority to conserve and protect the biological diversity and productivity of Canada's three oceans by managing marine resources, human use activities, and by applying a precautionary approach to the management of ocean spaces.

In the Department, the Fisheries Protection Program (FPP) is responsible for the administration of the fisheries protection provisions of the *Fisheries Act*, including the establish-

ment of guidelines and regulations, and the administration of certain provisions of the *Species at Risk Act*. The Conservation and Protection Directorate is responsible for investigating incidents of non-compliance.

Federal management responsibilities include salmon conservation and use, stock assessment, and habitat protection and restoration.

Along with other departments, DFO has legislative responsibilities for federal environmental assessment regimes including the *Canadian Environmental Assessment Act* (CEAA), the *Yukon Environmental and Socio-Economic Assessment Act* (YESAA), and regimes under land claims agreements. FPP works collaboratively with stakeholders to manage impacts on fisheries resulting from habitat degradation or loss, alterations to fish passage and flow,

and aquatic invasive species. FPP provides advice to proponents that enables them to proactively avoid and mitigate the effects of projects on fish and fish habitat. FPP reviews proposed activities that may affect fish and fish habitat, and ensures compliance with the *Fisheries Act* and the *Species at Risk Act* by issuing authorizations and permits, with conditions for offsetting, monitoring, and reporting when appropriate.

BC Government

The Province of BC has jurisdiction over Crown lands in BC, which includes the foreshore, beds of rivers, streams, lakes, and bounded coastal water. As a result, wild salmon and their habitats are directly impacted by provincial decisions on land and water use and resource development activities, such as forestry, mining, dam construction, agriculture, and highway and pipeline development.

In recognition of this, the Province has put in place many tools including legislation and regulations to ensure that fish habitat is protected and maintained during provincially regulated activities. The Province also carries out the duty to consult First Nations on provincial decisions that could affect salmon habitat and associated Indigenous interests. It should be noted, however, that the administration of the fisheries protection provisions under the *Fisheries Act* remains with the federal government.

Key provincial tools for protecting fish habitat include the *Forest and Range Practices Act*; the *Oil and Gas Activities Act*; the *Water Sustainability Act*; and the *Riparian Areas Protection Act*.

Lessons Learned | Indicators and Tools

Round table participants, including First Nations, provincial and local government agencies, and community groups, are using ecosystem-based approaches in pilot areas, such as Barkley Sound, the Cowichan Watershed, the Okanagan Basin, and the Skeena River Watershed to determine the best way to incorporate ecosystem information in their area. The main focus has been to develop ecosystem-related indicators and science-based tools for integrating salmon conservation and other planning objectives. Examples include:

- Multi-trophic level (food-web-related) indicators of changes in lake ecosystems for Barkley Sound sockeye salmon.
- A web-based decision support tool for balancing fish protection and other water management objectives in the Okanagan Basin.
- Indicators of riparian ecosystem integrity for salmon-bearing streams based on changes in the salmon predator-scavenger complex.
- A status assessment of the Skeena River estuary from the salmon perspective, using habitat pressure and state indicators of water quality, salmon habitat, food, and predation.

Forest and Range Practices Act, FRPA (2002) provides regulatory direction for fish habitat protection, including protection of riparian habitat through required riparian setbacks, safe fish passage at stream crossings, and road building practices that manage for sediment input. FRPA regulations have provisions for Fisheries Sensitive Watersheds, and for the habitat of fish that are at risk through the provision of Wildlife Habitat Areas.

Oil and Gas Activities Act, (2008) includes the Environmental Protection and Management Regulation. The provisions in this regulation are patterned on the FRPA and associated regulations outlined above.

Water Sustainability Act, (2016) allows the Province to issue temporary orders that prioritize minimum stream flows for fish and ecosystem values during water shortages, and maintains the Minister's power under the *Riparian Areas Protection Act* to reduce water use to protect fish habitat.

Wild salmon and habitats are directly impacted by decisions on land and water use and resource development activities.

The *Water Sustainability Act* ensures that both surface and groundwater decisions consider environmental flow needs, and it enables the creation of “Water Sustainability Plans” to address water use conflicts and protect ecosystem health. It also allows for the setting of “Water Objectives”, so that land and resource users will consider criteria

Fish and Forests | Studying Interactive Impacts

Forestry activities in BC follow Provincial laws. Forest activities affect the forest ecosystem and can impact fish habitat requirements including physical habitat-structure alterations, water temperature-related shifts, and trophic responses. Evaluating these kinds of impacts has been a priority for resource managers and scientists for over 50 years, and six major studies have generated data on the impacts to habitat and salmon production in coastal BC. Research results have identified key restoration priorities and approaches needed to recover habitat and freshwater productive capacity.

BC has also developed various ecological condition assessment tools to evaluate the effectiveness of riparian management under provincial legislation, including 1) Routine Riparian Effectiveness Evaluation, 2) Watershed Status Evaluation and 3) the Provincial Cumulative Effects Assessment Protocol. While these have been developed to assess the effectiveness of forestry practices, they are transferable broadly to assess the effects of other human-related activities such as mining, oil and gas development, and agriculture.

For more information visit: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/fish/fish-forestry>

to sustain water quantity, water quality, and aquatic ecosystems in their decision-making.

Riparian Areas Protection Act (2016) and Riparian Areas Regulation, RAR (2006) are designed to complement the *Fisheries Act* approval process for developments in and around fish habitat. RAR calls on local governments to protect riparian areas during residential, commercial, and industrial development by ensuring that a Qualified Environmental Professional (e.g. a professional Biologist, Agrologist, Forester, Geoscientist, Engineer, or Technologist) conducts a science-based assessment of proposed activities. The purpose of RAR is to protect the many and varied features, functions and conditions that are vital for maintaining stream health and productivity.

Local Governments

BC municipalities and regional districts have a role in protecting salmon habitat on private land through their authority for land use planning and management under the *Local Government Act*, and through provisions under the provincial *Riparian Areas Protection Act* which allow municipalities to use their zoning bylaws, development permits, and other land use management tools to implement riparian area protection provisions. Local governments may also contribute to protecting salmon habitat through educational programs about stream stewardship, watershed and storm water management plans, parkland acquisition, and landowner agreements.

Strategies 2 & 3: WSP Activities 2018–2022

Action Step	Activity ID	Activity	Lead DFO Sector/Program	Target Completion
2.1 Document habitat characteristics	11	Work with PSF to document salmon habitat characteristics	Science–ESD, StAR	March 31, 2021
2.1	12	Use information from Activity ID 11 regarding habitat status indicators to inform freshwater elements of a risk assessment framework in order to explain status and trend patterns exhibited by a CU or groups of CUs (e.g. WCVI Chinook)	Science–ESD, StAR	March 31, 2021
2.1	13	Use results from Activity ID 12 to identify potential actions that can address key threats and limiting factors in an integrated management rebuilding plan for subject CUs (e.g. WCVI Chinook)	Science–ESD, StAR Fisheries Management–RMPD	March 31, 2022
2.2 Select indicators and develop benchmarks for habitat assessment	14	Assemble data, conduct analysis and publish one or more reports to identify a core set of environmental indicators	Science–ESD, StAR	Ongoing
Additional strategy work	15	Apply WSP objectives to all current and future Ecosystem Management Branch work that may affect wild Pacific salmon habitat	Ecosystem Management–FPP	Ongoing
3.1 Identify indicators to monitor status of freshwater ecosystems	16	Publish report on Risk Assessment Method for Salmon (RAMS) to assess potential for disturbance events or regimes in freshwater & marine ecosystems to control CU status and trend patterns	Science–ESD	March 31, 2019
3.2 Integrate climate and ocean information into annual salmon management processes	17	Publish report(s) on results from initial application(s) of RAMS from one or more workshops (e.g. Cowichan Chinook, Barkley Sockeye)	Science–ESD	March 31, 2020
3.1, 3.2	18	Use results from Activity ID 17 to identify potential actions and address key threats and limiting factors in any rebuilding plans for subject CUs (e.g. WCVI Chinook)	Science–StAR Fisheries Management–RMPD	March 31, 2021
3.1 Identify indicators to monitor status of freshwater ecosystems	19	State of the Salmon Program to assess status and trends of salmon and associated environmental conditions in freshwater and marine ecosystems	Science–ESD, StAR, OSD	Ongoing

Strategies 2 & 3: WSP Activities 2018–2022

Action Step	Activity ID	Activity	Lead DFO Sector/Program	Target Completion
3.1, 3.2	20	Assemble environmental data (e.g. climate indices, ocean circulation indices, freshwater temperature, discharge, nutrient loads, primary production, etc.) to assess potential for interactions among climate, ecosystems and habitat state to control status and trend patterns exhibited by priority CUs (e.g. southern Chinook and Sockeye) in representative biogeoclimatic zones (e.g. Fraser, West Coast Vancouver Island)	Science–ESD, OSD, StAR	Ongoing
3.1, 3.2	21	Report on indicator utility to compare the role(s) of major freshwater and marine ecosystem drivers in controlling status and trend patterns exhibited by data rich CUs and associated CU aggregates originating from two or more major biogeoclimatic zones in Canada’s Pacific Region.	Science–ESD, StAR	March 31, 2021
3.2	22	Provide salmon and environmental time series information (e.g. coast-wide Sockeye indicators) to State of the Ocean meeting	Science–ESD, StAR	Ongoing
3.2	23	Develop options and recommended actions through the Salish Sea Marine Survival Project to address human threats and biological limiting factors affecting survival of Chinook and Coho in the Salish Sea	Science–ESD, StAR	December 01, 2019
Additional strategy work	24	Support ongoing national and provincial initiatives and increase interagency communication on cumulative effects assessment and management issues pertaining to shared aquatic ecosystem values	Policy and Economics–Policy	March 31, 2019

Maintaining & Rebuilding Stocks

WSP Strategies 4 & 5



Photo: Eiko Jones • Female Chinook Salmon (*Oncorhynchus tshawytscha*)

Strategy 4 | Integrated Strategic Planning

The WSP recognizes that restoring and maintaining healthy and diverse salmon populations and habitats requires a coordinated focus on planning for these stocks – from fisheries management decisions to habitat actions.

Priorities to 2022

- Develop an initial set of long-term strategic plans (rebuilding) for prioritized Red CUs/MUs
- Complete recovery potential assessments for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed salmon species/stocks, and begin SARA Recovery Strategies, Action Plans and Management Plans for SARA listed species
- Investigate new research tools to diagnose and study disease and other conditions affecting wild salmon
- Continue to inform, develop, and implement sustainable aquaculture measures to mitigate impacts to wild salmon

Integrated Strategic Plans

Many planning activities have taken place over the last 13 years, including: management actions tracked in IFMPs, local discussions about habitat options, the development of the National Recovery Strategy for Sockeye Salmon Sakinaw Lake Population, the National Recovery Strategy for the Sockeye Salmon (Cultus population) in BC, and the highly successful Cowichan process (see “Three Planning Examples” for more information). However, the WSP called for integrated strategic plans of all CUs and groups of CUs and this work is in the early stages.

Over the next five years, the Department will be focusing on two types of integrated strategic plans:

1) commencing SARA recovery planning for any salmon species listed under SARA, and 2) developing an initial set of long-term strategic plans at the MU level for prioritized MUs, which includes Red CU level information where available.

Extirpated, endangered or threatened species listed under SARA require Recovery Strategies that identify goals, objectives and approaches for recovery and Action Plans that identify measures required to implement the Recovery Strategies. Species listed as special concern under SARA require a Management Plan that includes measures for the conservation of species.

The second type of integrated strategic planning involves development of long-term strategic plans at

the MU level. These plans will build on IFMPs and include elements from the WSP, the Sustainable Fisheries Framework, and any relevant measures respecting rebuilding fish stocks that may be established under a revised *Fisheries Act*.

While there are subtle differences in terminology in these three frameworks, all are focused on moving stocks to a healthier status zone. Integrated strategic plans will include information such as stock status description, stock trends, reason(s) for the stock's decline (if applicable), enhancement plans, habitat concerns and opportunities, and management actions. While these plans will be at the MU scale, more information will be added at the finer CU scale as it becomes available, including information specifically targeted to rebuilding prioritized Red CUs. Initially, DFO will incorporate information it already has access to into the plans for review by First Nations and stakeholders. DFO will then work with groups to include additional information before finalizing.

This follows a similar framework to that used for developing IFMPs. Although developed annually, IFMPs provide overarching guidance for salmon fisheries management in the Pacific Region. IFMPs are quite comprehensive and integrated in nature, but also involve significant contributions of time and effort from all parties.

Pilot Plan | West Coast Vancouver Island Chinook Rebuilding

The West Coast of Vancouver Island (WCVI) Chinook rebuilding pilot plan is a response to the Auditor General's October 2016 report on “Sustaining Canada's Major Fish Stocks” (specifically recommendation 2.28). As one of 19 priority fish stocks identified for rebuilding plan development, DFO and a broad range of partners are conducting research and habitat assessments for WCVI Chinook (funded through various sources, including the DFO National Rebuilding Program, the Pacific Salmon Treaty, local fundraising, and other external funders).

Risk assessment workshops with Indigenous groups and relevant stakeholders are being held, often through local round tables, to determine risks and potential actions for rebuilding WCVI Chinook populations. A collaboratively developed rebuilding plan, which will be made publicly available through DFO's website, is anticipated to be completed by 2020–2021.

Species At Risk Act (SARA) | Restoring Healthy Populations

When a species is listed as endangered, threatened or extirpated under SARA, a Recovery Strategy must be prepared followed by an Action Plan, and critical habitat must be identified and subsequently protected from destruction.

SARA is a federal law with three main goals:

- 1) Prevent extirpation and extinction
- 2) Recover extirpated, endangered or threatened species
- 3) Manage species of special concern

When applied to salmon populations, these goals align with the WSP objective to safeguard genetic diversity and the goal of restoring healthy and diverse salmon populations.

SARA listing advice is comprised of four regional components, each of which considers consultation and engagement with Indigenous groups, stakeholders, and others:

- 1) Recovery Potential Assessment: Peer-reviewed process that provides advice on status, threats, feasibility of recovery, allowable harm and possible mitigation, and population and distribution objectives.
- 2) Proposed Management Scenarios: Management scenarios outline possible actions to mitigate human threats in the event that a species is, or is not, listed.
- 3) Socio-Economic Analysis: A peer-reviewed process led by DFO Policy and Economic Analysis, socio-economic analysis estimates the costs and benefits to Canadians of protection and recovery measures, and assesses the regional impacts and distribution of costs and benefits.
- 4) Consultations: Public consultations gather input on whether or not the species should be listed.

If assessed as at risk by COSEWIC, the Government of Canada must respond in one of three ways:

- 1) Listing the species under SARA
- 2) Declining to list the species under SARA
- 3) Referring the species back to COSEWIC for further consideration

For those species already assessed by COSEWIC, DFO is undertaking analyses and developing advice for the Government to make a final listing decision. The listing advice includes analysis of available scientific information, socio-economic costs and benefits, as well as a review of feedback received from Indigenous communities and other parties.

COSEWIC

The Committee on the Status of Endangered Wildlife in Canada is an independent advisory panel that assesses the status of wildlife species.

What SARA Listings Mean

Endangered, threatened or extirpated: If a species is listed as endangered, threatened or extirpated, prohibitions come into place (for example, against killing, harming, and possessing the species). A Recovery Strategy must be prepared, followed by an Action Plan, and critical habitat must be identified and subsequently protected from destruction.

Special concern: If a species is listed as special concern, a Management Plan must be developed that identifies measures for the conservation of the species. Critical habitat is not identified for species of special concern.

Declining to list the species: Species that are declined for listing often have focused management measures put in place.

COSEWIC Salmon Assessments

		Designatable Units (DUs)*	
Endangered	Sakinaw Sockeye		2016
	Okanagan Chinook		2017
	Fraser Sockeye*	8	2017
Threatened	Interior Fraser Coho		2016
	Fraser Sockeye*	2	2017
Special concern	Fraser Sockeye*	5	2017
Not at risk	Fraser Sockeye*	9	2017
Will be assessed	Southern BC Chinook		

* 24 DUs total, including Cultus Lake Sockeye

“ ... Across BC and Yukon, planning related to salmon occurs at various geographic scales and for a variety of purposes.

WSP, 2005; P. 25

Planning Structures

In addition to developing integrated strategic plans, the WSP called for “a new planning structure” which included “bilateral consultations between Governments and First Nations... complemented by broader local and eventually region-wide input” (WSP, 2005, p.27).

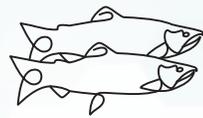
DFO is committed to working with Indigenous groups and others, and relies on many different scales of planning, including harvest, watershed, and coastal marine planning. However, the WSP also states, “It is suggested that local planning committees for sub-regions need to be established that can bring together all local First Nations governments, harvesters, community interests, local and regional government and other stakeholders to link with more localized projects important to local areas (like Watershed-based Fish Sustainability Planning processes) and assemble, assess and analyze information and seek local consensus” (WSP, 2005, p. 27).

While this may work in some situations, some targeted WSP related planning processes on southern Vancouver Island have pointed to the need for several “winning conditions” to be in place in order for this type of planning committee to succeed.

8 Winning Conditions for Wild Salmon Integrated Planning

Over the last decade, the Department has successfully engaged Indigenous communities and others in integrated wild salmon planning on the West Coast of Vancouver Island and in the Cowichan Valley. While each situation is slightly different, the winning conditions outlined below have consistently been relevant. Although it is important to recognize that there is no blanket approach to successful integrated planning, these lessons are important.

- 1 **Collaboration and partnerships are crucial throughout the planning process.** First Nations, other levels of government, stakeholder, and other partners should be involved early on and throughout the planning processes, including setting objectives, and developing and evaluating management strategies.
- 2 **Each planning initiative should have a clear vision, goal(s) and governance structure.** A Terms of Reference that identifies the planning participants, their roles and responsibilities, objectives, process, timelines, resources, and deliverables is key to clarifying the vision, goal and governance of planning initiatives. Furthermore, there must be a supportive legislative and policy framework in place.
- 3 **It is important to understand the status of fish and fish habitat in a location,** including a comprehensive view of threats to their health, their role in the broader ecosystem, and limiting factors.
- 4 **The planning process must be supported by sound science and technical capacity,** including objective setting, sufficient data, and analytical and interpretive capacity to evaluate options to rebuild and monitor CUs.
- 5 **Parties must be willing to recognize that implementing the WSP will require the consideration of priorities** and, at times, the balancing of different interests.
- 6 **Transparency is key.** Decisions made at each stage of the process must be documented and communicated to participants/partners.
- 7 **Every planning process requires sufficient resources and practical timelines.** Processes take considerable time and resources, for DFO staff and for partners and stakeholders participating in the process. This includes an adequate commitment of time by all parties, a pragmatic schedule for conducting the work, a realistic funding strategy, and the availability of adequate knowledge and data.
- 8 **Plans cannot succeed without support for implementation and monitoring.** Partnerships are key to the implementation of management actions, and may require cross-jurisdictional integrated plans.



BY THE NUMBERS

34

The number of salmon Management Units (MUs) — a group of salmon CUs combined for the purposes of stock assessment and fisheries management.

Wild Salmon Planning | Understanding and Mitigating Risks

The Salmonid Enhancement Program (SEP)

SEP aims to rebuild vulnerable salmon stocks, provide harvest opportunities, improve fish habitat to sustain salmon populations, support Indigenous and coastal communities in economic development, and engage British Columbians in salmon rebuilding and stewardship activities.

SEP work includes operating 23 major enhancement facilities (17 major hatcheries and 6 spawning channels) for the purposes of conserving vulnerable stocks and supporting harvest stock assessment activities. SEP staff undertake production planning efforts that link hatchery releases to fishery requirements, guide salmon habitat restoration work through the Resource Restoration Unit (RRU), work with partners through the Community Involvement Program (CIP) to conduct salmon habitat restoration, and plan, monitor and report on indicator populations for the purposes of stock assessment.

While some salmon populations depend on enhancement for continued survival, it is also acknowledged that enhancement poses risks to wild salmon. For example, wild populations harvested with more productive enhanced populations may be overexploited; wild salmon may have to compete with enhanced salmon for food and space in marine and freshwater environments; and hatchery practices may alter or weaken genetic diversity and/or have other genetic and epigenetic impacts on naturally spawning fish.

The Planning and Assessment component of SEP contributes to DFO's efforts to conserve Pacific salmon stocks by working to ensure genetic diversity in enhanced salmon populations is maximized and negative genetic or epigenetic impacts are minimized.

This is demonstrated by the development of enhancement guidelines to mitigate risks to wild salmon (Withler et al., 2018) and the development of population assessment protocols to ensure proportionate natural representations of wild populations are maintained in enhanced systems. The current Biological Risk Management Framework for Enhancing Salmon in the Pacific Region (DFO, 2013) outlines biological risk associated with each stage of the enhancement process on a hatchery activity basis.

Aquaculture in British Columbia

DFO has the jurisdictional authority as the primary regulator of aquaculture activities in BC. DFO works with the Province of BC, First Nations, industry, and other partners to ensure that aquaculture is sustainable and that potential risks to wild fish stocks and ecosystems are identified and appropriately managed. DFO undertakes this work under the British Columbia Aquaculture Regulatory Program (BCARP), set up in 2010 to oversee aquaculture in BC. This regulatory regime seeks to ensure that the aquaculture industry operates in an environmentally sustainable manner that minimizes risk to wild fish stocks and aquatic ecosystems. DFO's Aquaculture in British Columbia website outlines regulations, environmental management requirements and compliance and monitoring activities in place to ensure that the industry operates in a sustainable manner.

DFO is committed to better understanding risks to wild salmon, including ensuring the effective implementation of the precautionary principle when considering marine finfish aquaculture. Research related to potential impacts of disease transmission from farmed salmon to wild salmon may be accessed on DFO's Aquaculture science and research website.

In spring 2018, the Commissioner of the Environment and Sustainable Development released a report with recommendations on how DFO can improve its aquaculture program. DFO is in agreement with the report and has begun work to respond to the recommendations. The Government of Canada has also established an independent expert panel on aquaculture science, led by Canada’s Chief Science Advisor, to provide recommendations on the appropriate use and consideration of scientific evidence in protecting the marine environment in decision-making on aquaculture.

Similarly, BC’s Minister of Agriculture’s Advisory Committee on Finfish Aquaculture (MAACFA) released their report in April 2018 which outlined short and long term actions under six broad themes: Salmon Farm Locations; Aboriginal Rights and Title; Marine Planning and Community Engagement; Pathogens and Disease; Alternate Technologies and Approaches; and

Transparency and Information Gaps. The report lists six strategic recommendations for both BC and DFO. Recommendations from these reviews, combined with new science information and ongoing federal-provincial dialogue, will be used to inform future aquaculture management decisions.

The Department will also continue to build on work through the Aquaculture Coordinating Committee of the First Nations Fisheries Council and bilaterally, as requested, to increase engagement with BC First Nations and their involvement in data collection, monitoring and science related to finfish aquaculture.

The Government of Canada supports research and development of closed containment aquaculture systems, and their potential application in British Columbia. This research builds on lessons learned from the Kuterra Land Raised Atlantic Salmon farm venture and from experiences in Norway, the United States and elsewhere.

Aquaculture Conditions | Monitoring Fish Health

Fish health on British Columbia salmon farms is managed throughout the production cycle to maintain healthy fish populations and to identify and address disease occurrences as soon as they arise.

The Canadian Food Inspection Agency (CFIA) has a number of responsibilities under the *Health of Animals Act*, *Feeds Act*, and *Fish Inspection Act*.

In particular, the CFIA prevents the introduction and spread of disease through the National Aquatic Animal Health Program. The CFIA also inspects feeds fed to farmed marine finfish to ensure they are safe for consumption by the fish, and subsequently ensures that aquaculture products are safe for human consumption. Moreover, when a reportable or immediately notifiable disease listed in the CFIA’s Health of Animals Regulations or the Reportable Diseases Regulations is reported in farmed marine finfish, the CFIA conducts an investigation to verify the presence of the disease, based on DFO’s diagnostic testing. CFIA works with other authorities

such as DFO to deal with the disease and to prevent its spread.

Aquaculture licence conditions set out mandatory monitoring and reporting requirements, and DFO approved Fish Health Management Plans (FHMPs) are a central component of on-farm fish health management. FHMPs detail the principles the licensee must follow to maintain fish health and biosecurity at the farm. Salmon farm licence holders must also routinely submit a range of

fish health data to DFO to ensure any impacts are appropriately mitigated. Both DFO and aquaculture companies have veterinarians on staff (or available on contract) to monitor fish health on farms.

In addition to Health Management Plans and company reporting, the Department oversees the health of cultured and wild salmon through the Fish Health Audit and Surveillance program.

DFO Fish Health Audit and Surveillance Program Activities Include:

- Inspecting farm sites to ensure compliance with Fish Health Management Plans and to verify the accuracy of industry reporting to DFO
- Collecting samples of cultured fish for routine diagnostic disease screening
- Conducting sea lice audits to verify industry counting processes and results
- Conducting surveillance for emerging disease

Sustainable Aquaculture in BC

DFO's Aquaculture in BC website outlines regulations, environmental management requirements and the monitoring and compliance activities in place to ensure that the industry operates in a sustainable manner.

For more information visit:

<http://www.dfo-mpo.gc.ca/aquaculture/aquaculture-eng.html>

Aquaculture | Audit and Recommendations for Salmon

In its spring 2018 Report, the Commissioner of Environment and Sustainable Development (CESD) tabled in Parliament eight recommendations for improvement to DFO's aquaculture program.

In 2017, the Commissioner of Environment and Sustainable Development (CESD) audited DFO and CFIA on how they managed the risks associated with salmon aquaculture, and if that management was consistent with each organization's mandate relating to the protection of wild fish. On April 24, 2018, the spring 2018 Report of the CESD was tabled in Parliament.

The report makes eight recommendations on how DFO can improve its aquaculture program. DFO agrees with all eight recommendations and is taking appropriate actions to ensure they are addressed in order to enhance regulation of the aquaculture industry. In areas where the recommendations are outside DFO's current responsibilities, the Department will work with provincial and territorial counterparts.

8 Recommendations for DFO's Aquaculture Program

- 1 DFO should conduct its planned disease risk assessments by 2020 to increase knowledge of the impacts of aquaculture on wild salmon, as committed in its response to the Cohen Commission.
- 2 DFO and CFIA should clarify their roles and responsibilities for managing emerging diseases risks to mitigate the potential impacts of salmon farming on wild fish.
- 3 DFO should determine and communicate how it applies the precautionary approach to managing aquaculture when there is uncertainty about the impacts of aquaculture on wild fish. DFO should also clearly articulate the level of risk to wild fish that it accepts when enabling the aquaculture industry.
- 4 DFO should establish thresholds for the deposit of drugs and pesticides into net pens to more effectively minimize harm to wild fish.
- 5 DFO should develop and implement an approach to validate the accuracy of the information that aquaculture companies report on their drug and pesticide deposits.
- 6 DFO should initiate discussions with its counterparts in the Atlantic Provinces to address the quality and maintenance of equipment on salmon farms to prevent fish escapes.
- 7 DFO should more effectively enforce aquaculture regulations and pursue additional enforcement measures.
- 8 DFO should provide timely public reports with detailed information on companies' drug and pesticide deposits and on the health of farmed fish in British Columbia.

Addressing the Decline of Steelhead

Steelhead Trout share habitat and co-migrate with Pacific salmon species and are sometimes referred to as Steelhead Salmon. The Province of BC manages habitat and recreational Steelhead Trout fisheries, and in 2016 released a Provincial Framework for Steelhead Management in British Columbia.

Under the *Fisheries Act*, DFO is responsible for protecting fish habitat, and cooperates with BC on reducing incidental impacts of salmon fisheries on co-migrating Steelhead Trout, including timing of commercial salmon fisheries openings, use of selective fishing gear, enforcement of bycatch licence conditions, support for stewardship, and the implementation of regulatory measures to protect fish habitat.

Unfortunately, Thompson River and Chilcotin River Steelhead populations have been assessed by COSEWIC as endangered, and will be considered for SARA listing. Appropriate management objectives will consider a range of objectives including conservation; sustainable harvests of salmon for Food, Social and Ceremonial (FSC) needs; recreational and commercial fisheries; and cultural, social and economic objectives.



Steelhead Trout (*Oncorhynchus mykiss*)

WSP and Our Partners | Integrated Planning

Integrated planning can be multi-stakeholder, multi-spatial, multi-temporal, and/or address multiple risks.

Skeena Fisheries Technical Committee

The Committee is comprised of representatives from the Gitksan, Wet'suwet'en, Gitanyow, Lake Babine and Tsimshian member Nations, as well as representatives from DFO and relevant provincial agencies. It provides a forum for discussion on technical issues in fisheries management and salmon biology and meets monthly to plan and report on a range of initiatives, including stock assessment, habitat assessment and status, water quality studies, limnologic surveys and selective harvest techniques.

Cowichan Watershed Health and Chinook Initiative

In the Cowichan Valley, First Nations and DFO have partnered with provincial and local governments and local stakeholders to develop a salmon-focused community-based initiative for watershed health, which recognizes Chinook Salmon as a key indicator species of ecosystem health. The result of the initiative will be a strategic action plan with an emphasis on reducing risks to salmon production, and achieving watershed health goals for hydrology, water quality, habitat, and the ecosystem/biological communities.

Southern BC Chinook Strategic Planning Initiative

Working together, DFO and several BC First Nations have led a multi-stakeholder process to address the declines in many southern Chinook Salmon populations to produce a high-level strategic plan that includes trends in aggregated CU and habitat status, limiting factors and threats, objectives, and management strategies. The management strategies do not prescribe specific management actions, but are broad in scope including harvest, hatcheries, habitat, and ecosystems.

Barkley Sound Sockeye and Chinook

The Barkley Sound Area 23 Salmon Harvest Committee was created by local First Nations and stakeholder members to advise DFO on annual harvest plans and in-season decisions. The committee has produced a local IFMP for Sockeye Salmon, and is developing another for Chinook Salmon. These plans use biological benchmarks and socio-economic factors to develop fishery reference points and decision rules to make harvest decisions. A similar table has formed in Area 25 Nootka, where local Chinook fishery plans are in development. Habitat status reports have been completed for 15 key Chinook watersheds along the West Coast of Vancouver Island.

Strategy 4: WSP Activities 2018–2022

Action Step	Activity ID	Activity	Lead DFO Sector/Program	Target Completion	
4.1	Implement an interim process for management of priority CUs	25	Include information on CU status considerations in IFMPs	Fisheries Management–SMCS Science–StAR	Ongoing
4.1		26	Publish guidance outlining how DFO responds to Red CUs	Fisheries Management–SMCS Science–ESD, StAR	March 31, 2022
4.1		27	Improve incorporation of existing available habitat and ecosystem status information into IFMPs	Fisheries Management–SMCS	Ongoing
4.1		28	Complete recovery potential assessments and identify rebuilding options for any COSEWIC assessed salmon species/stocks	Fisheries Management–SMCS	Ongoing
4.2	Design & implement a fully integrated strategic planning process for salmon conservation	29	Map CUs, freshwater and marine ecosystems, Fishery Management Units, and Outlook Units to clarify connections and nesting	Science–StAR	March 31, 2019
4.2		30	Develop fishery reference points and associated decision rules that consider biological and other factors for harvest management, as priority and capacity permits	Fisheries Management–SMCS Science–StAR	Ongoing
4.2		31	Develop a WCVI Chinook rebuilding plan	Science–StAR	2020
4.2		32	Upon SARA listing of any Pacific Salmon Designatable Units (DUs), initiate recovery planning processes	Ecosystem Management–SARA	Ongoing
Additional strategy work		33	Advance PNCIMA implementation, building upon PNCIMA plan in an Ecosystem-Based Management framework	Ecosystem Management–Oceans	Ongoing
		34	Document SEP program activity by CU (enhancement, community involvement, habitat restoration)	Ecosystem Management–SEP	June 2019
		35	Continue to implement transparent planning process for hatchery production taking into account the WSP objectives of wild salmon conservation and sustainable fisheries	Ecosystem Management–SEP	July 01, 2019
		36	Investigate new research tools to diagnose and study disease and other conditions affecting wild salmon	Science–ADGT	Ongoing
		37	Continue to co-lead the genomic research for the Strategic Salmon Health Initiative	Science–ADGT	December 2019
		38	Complete scientific research and a risk assessment process with respect to risk of net-pen salmon farms in the Discovery Islands area to migrating Fraser River Sockeye Salmon	Science–ADGT	Ongoing
		39	Review requirements for salmon farms to ensure risks to wild salmon are minimized	Fisheries Management–Aquaculture	TBC
		40	Ensure mandatory reporting related to the Aquaculture Activities Regulation	Fisheries Management–Aquaculture	Ongoing

Strategy 5 | Annual Program Delivery

Strategic plans developed in the spirit of WSP need to be operationalized through annual work planning cycles. Part of this work is ongoing, including assessing the status of salmon populations, planning and conducting annual fisheries and planning and implementing habitat management and annual enhancement activities.

Priorities to 2022

- Continue to assess the status of salmon populations
- Continue to plan and conduct annual fisheries through Integrated Fisheries Management Plans
- Continue to encourage and support partners (First Nations, community partners and other stakeholders) in habitat management through DFO programming and the Province of BC and Yukon Territory
- Continue to plan and implement annual salmon enhancement

DFO Planning & Program Delivery | Key Changes Resulting From WSP

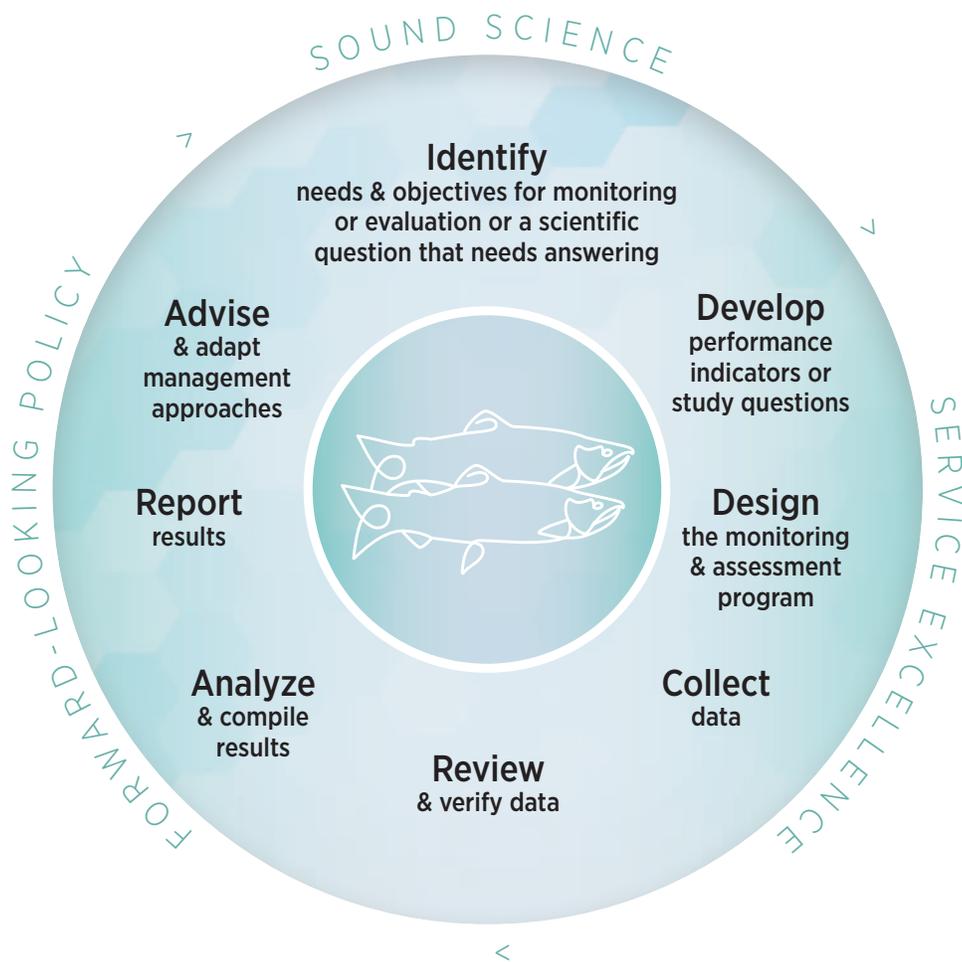
Over the last 13 years, programs have developed annual work plans that align with the WSP and factor it into fisheries management and other program decisions. While the WSP is only one of a collection of policies and government directives that guide DFO's planning and program delivery for fisheries management, to date, the WSP has resulted in some key management improvements, including:

- CU data incorporated into key fisheries and habitat management decisions
- Substantial salmon research into topics such as farmed salmon impacts on wild salmon and juvenile marine salmon
- Mixed stock harvest in Johnstone Strait commensurate with lower productivity, data deficiencies, and increased terminal fisheries focus
- Ongoing research into the impacts of aquaculture on wild salmon (see Strategy 4 for more information)

Lessons Learned | Fish Management

The goal and objectives of the WSP guides all salmon work at DFO. Over the last decade, this has fundamentally changed the way DFO approaches fish management in a number of ways. For example, although fishery reference points and decision points might be at an aggregated CU scale (e.g. Management Units or MUs), the scale of biological status assessment is now at the CU level.

Similarly, the use of selective harvesting approaches and movement away from large mixed-stock salmon fisheries are now incorporated into fisheries management planning to a greater degree, particularly as they pertain to uncertainty in expected returns and the need to be precautionary in setting harvest levels.



Stock Assessment Framework | Conservation, Biodiversity and Resource Use

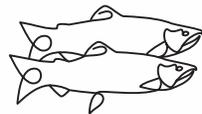
In support of DFO’s Mission and the goal of the WSP, DFO Science is working on a strategic planning process to inform the conservation of salmon, their habitats and sustainable fisheries across the region.

DFO Science has an assessment framework that considers conservation goals, managing for biodiversity and for diverse use of the resource. Salmon management and stock assessment is very complex and there is a need to define objective decision-making criteria to inform trade-offs.

More intensive monitoring and assessment does not always lead to better management outcomes. Conversely, data limited systems are not necessarily a problem when risk is managed by implementing a more precautionary management system. DFO Science is working on a strategic stock assessment planning process to inform the conservation of salmon, their habitats and sustainable fisheries across the region.

Stock assessment programs will continue to develop and adapt as more research is conducted and better tools are developed, including improved methodological standards (monitoring and quantitative assessment) and technology (lab methods, diagnostics, remote sensing, etc.), ecosystem and climate change research, data management standards and database development.

By clearly describing the information and methods required to monitor salmon populations and fisheries and by developing scientific advice to support sustainable resource management, DFO will be better able to share these responsibilities with partners.



BY THE NUMBERS

> 700

Number of SEP salmon production lines – the individual groups of enhanced salmon identified by a combination of the project, species, run timing, stock of origin, release strategy and release location.

Salmon Sustainability and Stewardship | Facilitating Community Culture

The Community Involvement and Resource Restoration Program (CIRRP) supports community aspirations to contribute to salmon sustainability and stewardship by providing technical advice and facilitating linkages between community groups and DFO subject matter experts.

The Community Involvement and Resource Restoration Program (CIRRP)

This program continues to contribute to DFO’s commitment to conserve salmon, their habitats, and the inherent value associated with the cultural, social and economic benefits of salmon. Community Advisors in this program support community groups in their aspirations to contribute to salmon sustainability and stewardship by providing technical advice and facilitating linkages and communications between community groups and subject matter experts within DFO.

As biological status is assigned to CUs, the program will begin to consider CU status when planning its activities. As part of this work, CIRRP has plans to inventory and document projects by type (hatchery, stewardship centre, restoration project) within CUs.

CIRRP is comprised of four sub-programs:

- 1) Resource Restoration Program (see Strategies 2 & 3 for more information)
- 2) Public Involvement Program
- 3) Community Economic Development Program
- 4) Stream to Sea Program

The Public Involvement Program (PIP) consists of a number of initiatives aimed at engaging citizens and building partnerships to facilitate a culture of salmon sustainability and stewardship.

PIP delivers two contribution programs: the Community Salmon Program, in partnership with the Pacific Salmon Foundation, and the SEP Contributions Program. Both are intended to enable British Columbians to participate in small scale projects that contribute to salmon sustainability.

The Community Economic Development Program works with local First Nations and coastal communities for the purposes of rebuilding vulnerable salmon stocks, supporting Pacific Salmon Treaty commitments to enable the monitoring and management of wild Pacific salmon stocks, contributing salmon to fisheries and engaging British Columbians in salmon stewardship.

Delivered within BC schools, the Stream to Sea Program aims to build salmon awareness and resource stewardship amongst schoolchildren.

WSP and Our Partners | Thinking About Management

A balanced approach for sustainable fisheries management makes explicit linkages between the risks, fishery requirements, wild salmon values, population goals, habitat capacity and a range of social objectives.

Planning and Implementing Annual Enhancement Activities

In Areas 23, 24 and 25 on the WCVI, SEP is working to develop a more integrated and transparent hatchery planning process that makes explicit linkages between fishery requirements, wild salmon values, population goals, habitat capacity and other social objectives.

To build understanding on how enhancement can achieve specific goals, as well as risks that may exist from hatchery production, SEP shares information with existing WCVI Roundtables comprised of representatives from local First Nations, commercial and

recreational fisheries, local hatcheries, ENGOs and DFO. Input is sought from participants on their vision for specific salmon populations, which informs group work on understanding the challenges and options to achieve goals. The intent of this process is to make well-informed decisions that consider both internal policies and science and external values and perspectives.

Working Towards Managing Healthy Salmon Populations

BC First Nations have been demonstrating terminal, in-river selective fisheries that help protect salmon diversity and

promote sustainable use. Terminal fisheries are those that occur near or in freshwater, such as at a river's mouth, where the targeted species or stock has returned to spawn.

The combination of terminal fisheries and the use of selective gear results in reduced pressure on weaker stocks relative to traditional mixed-stock marine fisheries. Selective fishing is a conservation-based management approach that allows for the harvest of surplus target species, while aiming to minimize or avoid the harvest of species or stocks of concern, or to release bycatch unharmed.

Strategy 5: WSP Activities 2018–2022

Action Step	Activity ID	Activity	Lead DFO Sector/Program	Target Completion
5.1 Assess the status of CUs and populations	41	Assess the value of annual lake stock assessments and monitoring programs for fall fry populations in the Fraser Basin with the goal of increasing work from two to four lakes annually	Science–ESD	March 31, 2019
5.2 Plan and conduct annual fisheries	42	Work towards implementation of Fisheries Monitoring and Catch Reporting Framework to incorporate risk-based standards and monitoring of harvester-funded programs	Fisheries Management–SMCS	Ongoing
5.4 Plan and implement annual enhancement activities	43	Develop explicit biological goals for hatchery-influence on populations	Ecosystem Management–SEP	June 01, 2020
5.4	44	Continue to implement transparent decision making framework for hatchery production in fishery planning processes that takes into account WSP objectives, balancing of risks of genetic effects, and the socio-economic benefits of increased stock abundance	Ecosystem Management–SEP	July 2019
5.4	45	Implement annual enhancement programs that utilize emerging science on hatchery-wild interactions	Ecosystem Management–SEP	Ongoing



Photo: Eiko Jones • Female Sockeye Salmon (*Oncorhynchus nerka*)

Strategy 6 | Performance Review

The WSP focused on accountability in relation specifically to the Policy, and Strategy 6 highlights the need to undertake post-season review of annual work plans, and to conduct regular reviews of the WSP. While annual review of work plans and post-season operations happens as a normal course of business, over the next five years, the Department is additionally committed to publicly reporting on the annual status of activities in this Plan. This will help improve the delivery of initiatives, aid in determining the success of the activities, and add to lessons learned at the five year mark. DFO is also accountable for wild salmon more broadly through its governance structures and this section outlines not only how the Department intends to publicly deliver on Strategy 6 of the WSP, but also how DFO Pacific governs the work to remain accountable and responsive to change.

Priorities to 2022

- Public reporting on the WSP Implementation Plan
- Update the WSP Implementation Plan, as necessary, based on renewed *Fisheries Act*

Assessing Progress | Tracking and Publicly Releasing Results

To ensure that the intent of the Implementation Plan is met, results will be tracked, key questions raised, risks and priorities identified for consideration, and results will be publicly released.

Annual Updates

The Department is committed to publicly releasing an annual document on its website that will help track DFO’s efforts in meeting the intent of the Plan. This document will highlight progress in key areas as well as mitigation strategies for any activities that are not on track. This will allow for adjustments to be made when activities are leading to unintended results and for the inclusion of additional activities. Key components of the Annual Update include:

- A general overview of progress on activities
- Activity status: on track or off track
- A rationale and/or mitigation strategy for activities that are off track including unforeseen pressures
- Any additional comments that help clarify and provide context
- Key performance indicators

5-Year Review

Near the end of the 5-year implementation cycle, a comprehensive report of progress achieved over the duration of the Plan will be publicly released. The purpose of the review is to assess WSP implementation progress, explore key findings, and help identify priorities for consideration in subsequent implementation planning. In this way, implementation will continue to build on past work to achieve incremental and ongoing progress.

Performance Indicators

A suite of quantitative performance indicators will be considered along with qualitative interview data.

The combined data will reveal output trends and metrics for specific or groups of activities, and will focus on results – what was achieved, what needs additional attention, and what elements of the Plan have changed over time. Understanding the practical realities of implementation will help the Department, its partners, and the public.

Annual reporting data will also help evaluators map where work has been concentrated and where gaps exist between work performed and broader WSP objectives. Qualitative interviews both inside and outside of the Department will explore WSP operations in greater depth, along with possible areas of focus for the subsequent implementation plan. Individuals with experience working on activities and engaged in implementation will be called on to speak to how well the results supported the goal and objective of the WSP. Through a combination of quantitative indicators and this research, the overall impact and effectiveness of the Plan on advancing the WSP can be measured. The results of this 5-Year Review will shape the implementation focus for the subsequent years (2023 and beyond).

Governance within DFO

Salmon-related work should not be viewed as linear or siloed, as it occurs across multiple sectors within DFO Pacific Region.

The Pacific Regional Director General has the overall responsibility and accountability for the delivery of activi-

Advantages of the Reviewing Process

Annual Update

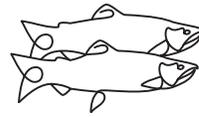
- Ensures Departmental accountability
- Provides early-warning of challenges that need to be addressed
- Provides a snapshot of annual progress
- Ensures the Department remains responsive to change as implementation unfolds
- Keeps interested parties informed on progress in a timely manner

5-year Review

- Details achievements in both quantitative and qualitative terms
- Addresses whether the WSP activities were implemented as planned
- Determines if we are closer to the goal and objectives of the WSP
- Informs future implementation plans

ties in the Plan. WSP-related work is integrated across the sectors, with strategic direction and oversight for the WSP and its implementation provided through a Strategic Salmon Directors Committee composed of Regional Directors and Directors with accountability for delivery of various salmon-related programs and regulatory responsibilities. This body also sets the forward agenda for strategic Pacific salmon issues in general and makes integrative decisions around Pacific salmon management and operations that are within the authority of its members.

The executive level committee discussions on Pacific salmon are also supported by the integrative work done by three regional departmental working groups: the WSP Committee, the Salmon Working Group and the Salmon Stock Assessment Coordinating Committee.



Key Questions

- Are we achieving what we set out to achieve?
- What gaps remain?
- Has our work resulted in demonstrable outcomes?
- Are we protecting salmon diversity?
- Are our partnerships working?
- What have we learned from the activities undertaken?
- Are there better ways of achieving results?
- Where should we focus resources for the next five years?

Lessons Learned | Past Independent Reviews of the WSP

Action Step 6.2 in the WSP committed to “an independent review of the success of the WSP in achieving its broad goals and objectives... within five years of its adoption” (DFO, 2005, p.34). In 2011, Gardner Pinfeld helped DFO meet this action step by conducting an independent review of the Department’s performance in achieving the WSP goal and objectives.

The review found that the rationale for the Policy remained relevant. It recommended that a detailed five-year timetable of DFO’s activities be developed, but also

recognized that the pace of implementation is influenced by the effectiveness of shared responsibilities with Indigenous governments, volunteers, stakeholders and other governments (Gardner Pinfeld, 2011, p. 18).

In October 2012, the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River came to similar conclusions when they released their final report (Cohen, 2012). The report highlighted the need for a detailed WSP implementation plan, annual progress

reporting on implementation, and a commitment to report publicly both in writing and on the DFO WSP webpage.

While this is the first comprehensive implementation plan for the WSP, the Policy has guided the Department’s work. Recommendations from the Gardner Pinfeld and Cohen documents have also guided the Department’s planning around wild salmon. Moving forward, DFO is committed to a more open and transparent reporting process, including communicating results publicly.

Strategy 6: WSP Activities 2018–2022

Action Step	Activity ID	Activity	Lead DFO Sector/Program	Target Completion
6.2 Conduct regular reviews of the success of the WSP	46	Coordinate annual WSP implementation reporting, and publish annual report on the DFO website	Policy and Economics–Policy	Annually, April 30
6.2	47	Coordinate 5-year reporting and publish 5-year review report on the DFO website	Policy and Economics–Policy	April 30, 2022
Additional strategy work	48	Coordinate the addition of activities into the WSP Implementation Plan based on renewed <i>Fisheries Act</i>	Policy and Economics–Policy	2020

Wild Salmon in Yukon | A Co-management Approach

Yukon salmon and their habitats are co-managed through an integrated process involving First Nation Governments, the Yukon Salmon Sub-Committee (YSSC) and the Government of Canada to ensure healthy and diverse salmon populations. Many of the salmon planning, management and restoration activities and initiatives in Yukon align with the goal, objectives and guiding principles of the WSP.

Salmon have always played a pivotal role in Yukon. They are an integral part of the ecosystem, providing a source of food and nutrients for a wide variety of flora and fauna, representing a key cultural icon and food source for Indigenous people for millennia, and more recently, have played a very important part in the socio-economic life and history of northwestern Canada.

Yukon salmon and their habitats are co-managed through an integrated process involving First Nation Governments, the Yukon Salmon Sub-Committee (YSSC) and the Government of Canada to ensure healthy and diverse salmon populations. Many of the salmon planning, management and restoration activities and initiatives in Yukon align with the goal, objectives and guiding principles of the WSP.

In 1993, Yukon First Nations and the federal and territorial governments signed the Umbrella Final Agreement, which provided a framework for subsequent Final and Self-Government Agreements between individual Yukon First Nations and the federal and territorial governments.

Since 1993, 11 First Nation Final Agreements (FNFAs) and associated Self-Government Agreements have been ratified in Yukon. These agreements define First Nation governance and administration, jurisdiction and law-making

authorities, land ownership, and set up a structure for community-based resource management. With specific reference to salmon, Chapter 16 of each FNFA establishes the YSSC, an advisory body to the Minister of Fisheries and Oceans Canada, as the “main instrument of salmon management in the Yukon”.

Self-governing Yukon First Nations, Fisheries and Oceans Canada and the YSSC all participate in the development and implementation of co-management strategies for Yukon wild salmon. This integrated approach facilitates the recognition and incorporation of traditional knowledge with scientific information and the participation of a broad range of interests in salmon management processes.

Fisheries and Oceans Canada is responsible for the conservation and sustainable use of Canada’s fisheries resources and serves to coordinate the management of Yukon River salmon. The YSSC is a sub-committee of the Yukon Fish and Wildlife Management Board (YFWMB) and is comprised of representatives nominated by First Nation Governments in each major drainage basin (Yukon River, Alsek River, and Porcupine River), the YFWMB and the Federal Government. The YSSC mandate is to make recommendations, in the public interest, to the Minister of Fisheries and Oceans Canada and to Yukon First Nations on matters related to salmon.

The YSSC engages with Yukon First Nations, fishery stakeholder groups and the public in the development of recommendations on allocation and management of Yukon salmon.

Yukon's formal co-management structure for salmon resources has been in place since 1993. Many provisions of the FNFAs relate directly to aspects of the WSP, including: the development of salmon management plans, salmon allocation, the definition of conservation, limitations on management and harvest, and the commitment to avoiding duplication in the management of salmon. Recognizing this, there is considerable interest in the WSP and its implementation in Yukon. Fisheries and Oceans Canada is committed to continued engagement with Yukon First Nation Governments and the YSSC to further salmon work in Yukon.

CU Assessment

Although the general distribution of the three species of salmon (Chinook, Chum and Coho) found in the Canadian portion of the Yukon River watershed is understood, and initial work was undertaken to define

Conservation Units, the preliminary CUs identified in 2005 have not yet been finalized.

CUs for Alsek River salmon located in southwestern Yukon were confirmed in 2005 as a component of the broader WSP CU definition process.

Habitat and Ecosystems

With the devolution of federal powers in 2003, the Yukon government was assigned administrative jurisdiction over land, water, mineral, and forest resource management for most of the territory. The federal government, through DFO, retains the authority for the conservation of fish habitat throughout Canada, including in Yukon. Recognizing the interrelationships between the development of land and water resources, and potential resulting effects on salmon and their habitat, DFO works closely with Yukon and First Nation Governments in the evaluation of potential effects of human activities on fish and fish habitat. Climate change effects are a key concern facing salmon habitat in the Yukon. The thawing of permafrost can affect the stability of riparian

International Partnerships for Sustainable Salmon

Yukon River Salmon Agreement (YRSA)

When adult Canadian-origin Yukon River salmon return to their natal streams to spawn, they migrate through Alaska before reaching Canada and their spawning grounds. There are active fisheries on both sides of the international border. Given the trans-boundary (international) nature of the Yukon River, management of Canadian-origin salmon stocks are governed under Chapter 8 of the Pacific Salmon Treaty (Yukon River Salmon Agreement, YRSA, 2001).

The YRSA establishes a distinct management regime for Yukon River salmon that adheres to the Pacific

Salmon Treaty's broad conservation and science-based management principles. The Agreement is administered by the bilateral U.S. — Canada Yukon River Panel composed of Canadian and U.S. representatives. The Yukon River Panel has the authority to provide recommendations on escapement

goals, harvest sharing provisions and management measures to signatories to the Agreement. Consistent with Yukon FNFAs, YSSC members comprise the majority of the Canadian members of the Yukon River Panel.

Working With U.S. Agencies to Explore Marine Ecosystem Influences

Working with U.S. agencies, both at the federal and Alaska state level, DFO Science in the Yukon is exploring development of methods to incorporate the effects of marine ecosystem influences on salmon survival in the Bering Sea to better forecast returns of Chinook Salmon in key aggregate stocks.



75,000

Kilometers of salmon-bearing rivers in Yukon

Through the co-management approach, Self-Governing Yukon First Nations work cooperatively with DFO and the YSSC to develop and implement community-based salmon management plans.

areas and has the potential to release sediment into watercourses. In 2016, the retreat of the Kaskawulsh Glacier resulted in the diversion of a significant volume of water from the Arctic to the Pacific drainage. The effects of this and other changes on salmon and salmon habitat are an emerging priority for monitoring and research activities.

Integrated Planning/Annual Program Delivery

Under the FNFAs, conservation is defined as “the management of Fish and Wildlife populations and habitats and the regulation of users to ensure

the quality, diversity and Long Term Optimum Productivity of Fish and Wildlife populations, with the primary goal of ensuring a sustainable harvest and its proper utilization”. Through the co-management approach, Self-Governing Yukon First Nations work cooperatively with DFO and the YSSC to develop and implement community-based salmon management plans, such as the recently published Selkirk First Nation’s salmon management plan. These plans will be a key element of the broader integrated management approach for the conservation and sustainable use of salmon stocks in Yukon.

Two Examples of Local Salmon Management Plans in Yukon

Tr’ondëk Hwëch’in (TH) is a self-governing Yukon First Nation whose name highlights the traditional importance of salmon harvest: Tr’ondëk refers to the confluence of the Klondike and Yukon Rivers, a place historically significant for harvesting Chinook Salmon, and Hwëch’in means “people”. The TH Traditional Territory is located in central Yukon, with Dawson City providing the base for the TH Government and many TH citizens. Dawson is the first community up-river from the U.S. border. Since time immemorial, TH has been reliant on Yukon River Chinook Salmon to provide for their subsistence harvesting needs.

TH was involved in the Pacific Salmon Treaty Yukon River Chapter 8 negotiation, and is active in implementing influential harvest management measures. In 2013, in an effort to improve border escapement and allow more Chinook to reach their Canadian spawning grounds, TH citizens passed a resolution to voluntarily withdraw from subsistence harvest for one life cycle. TH is active in harvest management, including reducing mesh size, releasing females, and promoting harvest of alternative species to help conserve Chinook Salmon. Restoration of the Klondike River Chinook stock has been initiated by TH.

Vuntut Gwitch’in First Nation (VGFN) is located in Old Crow on the Porcupine River, a large tributary to the Yukon River. Porcupine fall Chum stocks are harvested in mixed stock fisheries located downstream of the Canadian border and have experienced a significant decline in recent years. In 2016, the VGFN government expanded its community-based fish management planning process to include US fishery managers and the downstream neighbouring Gwitch’in community of Fort Yukon. This planning process has facilitated a better understanding of the issues between communities and potential measures for more effective conservation and harvest management.



Photo: Rory Hill • Coho Salmon; (*Oncorhynchus kisutch*)

DFO cannot achieve the goal of the WSP alone and the wisdom is clear...

“ No matter how strong our commitment to implementing the WSP, **success will demand better collaboration with all of the groups and individuals having an interest in wild Pacific salmon.** All have important roles to play in achieving sustainable management of wild salmon and their habitat. These groups monitor and report catches, protect and restore habitat, and carry out biological assessment work. Too often, this work is not integrated effectively with Departmental activities, which can diminish its value or simply result in wasted effort and funds.

WSP, 2005, P. 36

“ More collaboration is required to develop data standards, agree on methodologies, and share responsibility if we are to get the full benefit from the financial and human resources that are collectively dedicated to salmon stewardship. **Improved cooperation with partners will be an important ingredient for future success.** The more transparent process for decision-making underlying this policy will ensure that we are better equipped to achieve this important outcome.

WSP, 2005, P. 36

Looking Forward | Sustaining Salmon for Generations

Through this Implementation Plan, Fisheries and Oceans Canada is publicly committing to ongoing partnerships and accountability for the sustainability of wild Pacific salmon.

Documenting and reporting on the work that DFO plans to do over the next five years, both internally and with partners, is an important step in the continued work of reaching for the WSP goal of “restoring and maintaining diverse salmon populations for the benefit of the people and ecosystems of Canada in perpetuity” (WSP, 2005, p.8). Through this Implementation Plan, the Department is publicly committing to ongoing partnerships, accountability and sustainability. Regular reviews will track projects, and allow research and activities to adjust to new information, lessons learned, and improved ways of delivering on projects.

At the same time, the context around salmon management is changing. At the political level, new language has been introduced in Parliament for the *Fisheries Act* which would modernize safeguards to reflect the evolving nature of fish and habitat management. If adopted, the proposed amendments would precipitate regulatory, policy, and program changes

which could impact salmon and salmon habitat management. Concurrently, DFO is working with the Province of BC on an integrated approach to wild salmon. DFO is committed to transparency, and in 2020 will seek to include additional activities in this Implementation Plan stemming from any related changes to the *Fisheries Act*.

Salmon management is complex and interconnected and the broader themes of *Assessment, Maintaining and Rebuilding Stocks, and Accountability* demonstrate that individual strategies are not autonomous. Successful integration of all themes is necessary to ensure the overall success of salmon management, and DFO will continue to work both internally and externally to ensure this integration. By continuing to make fisheries management decisions grounded in science, even if this requires difficult choices, the Department will be well-placed to support the sustainability of wild Pacific salmon to 2022 and for generations to come.

Photo: Eiko Jones • Chum Salmon (*Oncorhynchus keta*)

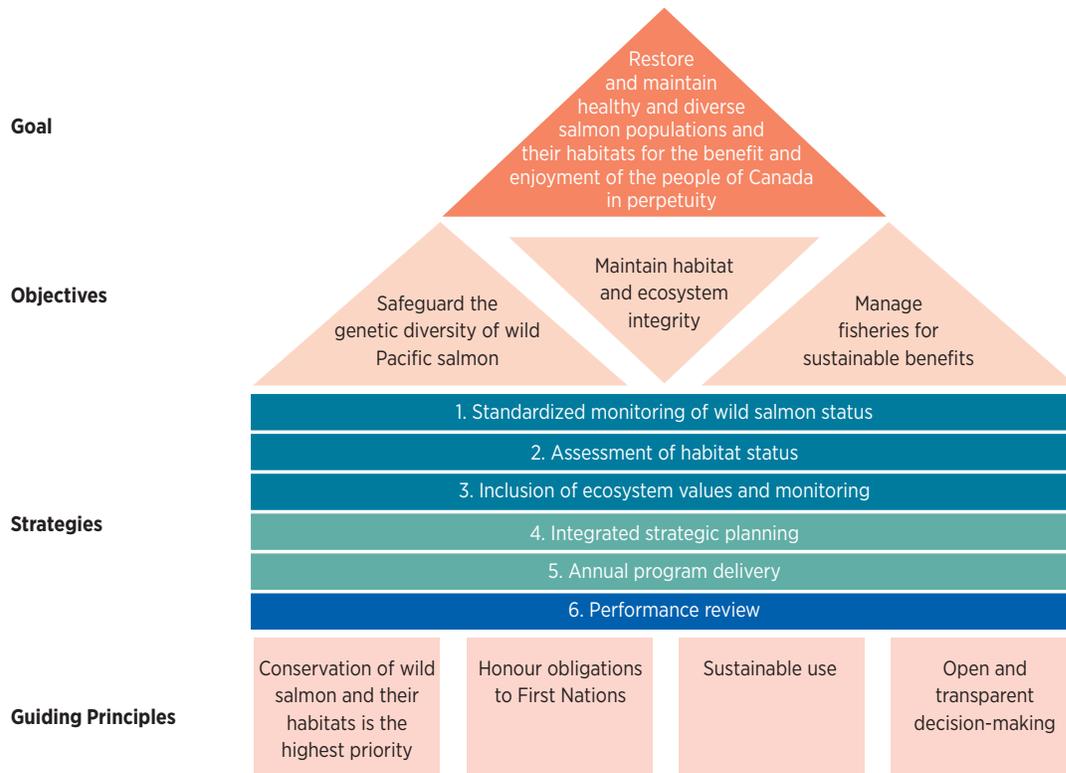
WSP Information & References

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Acronyms

ADGT	Aquatic Diagnostics, Genomics and Technology
BCARP	BC Aquaculture Regulatory Program
CEAA	<i>Canadian Environmental Assessment Act</i>
CESD	Commissioner of Environment and Sustainable Development
CFIA	Canadian Food Inspection Agency
CIP	Community Involvement Program
CIRRP	Community Involvement and Resource Restoration Program
COSEWIC	Committee On the Status of Endangered Wildlife In Canada
CRF	Coastal Restoration Fund
CSAS	Canadian Scientific Advisory Secretariat
CU	Conservation Unit
DFO	Fisheries and Oceans Canada
DU	Designatable Unit (under SARA)
ENGO	Environmental Non-Governmental Organization
ESD	Ecosystem Science Division
FHMP	Fish Health Management Plan
FLNRO	Forest, Lands, Natural Resource Operations & Rural Development
FNFA	First Nations Final Agreement
FPP	Fisheries Protection Program
FRPA	<i>Forest and Range Practices Act</i>
FSC	Food, Social and Ceremonial
IFMP	Integrated Fisheries Management Plan
IKS	Indigenous Knowledge Systems
MAACFA	Minister of Agriculture's Advisory Council on Finfish Aquaculture
MU	Management Unit
NuSEDS	New Salmon Escapement Database Systems
NGO	Non-Governmental Organization
OPP	Oceans Protection Plan
OSD	Ocean Science Division
PD	Program Delivery
PIP	Public Involvement Program
PNCIMA	Pacific North Coast Integrated Management Area
PSC	Pacific Salmon Commission
PSE	Pacific Salmon Explorer
PSF	Pacific Salmon Foundation
PST	Pacific Salmon Treaty
QAMS	Quantitative Assessment Methods Section
RAMS	Risk Assessment Model for Salmon
RAR	Riparian Areas Regulation
REEFF	Regional Ecosystem Effects on Fish and Fisheries Section
RKW	Resident Killer Whale
RMPD	Resource Management Program Delivery
RRU	Resource Restoration Unit
SARA	<i>Species At Risk Act</i>
SEP	Salmonid Enhancement Program
SMCS	Salmon Management and Client Services
STAR	Stock Assessment And Research
WCVI	West Coast of Vancouver Island
WSA	<i>Water Sustainability Act</i>
WSP	Wild Salmon Policy
YESSA	<i>Yukon Environmental and Socio-Economic Assessment Act</i>
YFWMB	Yukon Fish and Wildlife Management Board
YRSA	Yukon River Salmon Agreement
YSSC	Yukon Salmon Sub-Committee

Goal & Guiding Principles of the WSP



Source: WSP, 2005

The 2005 Wild Salmon Policy house-shaped graphic (above) is intended to provide an overview of the WSP and illustrate that the Goal, Objectives, and Strategies of the Policy are built on, and supported by, a strong foundation of fundamental Guiding Principles.

While many of the aspects of the graphic and its intention remain true, with the passage of time some elements have, and will continue to evolve. In particular, the Guiding Principle "Honour obligations to First Nations" is outdated and should be considered to more broadly represent the Government of Canada's commitment to the United Nations Declaration on the Rights of Indigenous Peoples, and a renewed relationship with Indigenous peoples in Canada based on the recognition of rights, respect, cooperation and partnership.

WSP Implementation Over Time

1999

WSP consultations and development begin

2005

Wild Salmon Policy published after 5 years of consultations

2008

CSAS Science Advisory Report published: Framework for characterizing Conservation Units of Pacific salmon (*Oncorhynchus spp.*) for implementing the Wild Salmon Policy

2009

Cohen Commission called: Inquiry into the Decline of Sockeye Salmon in the Fraser River

•

CSAS Science Advisory Report published: Framework for implementation of the Wild Salmon Policy: Initial lists of Conservation Units for British Columbia

•

Sustainable Fisheries Framework announced with a suite of management policies to ensure conservation, sustainable use and economic prosperity

2010

Pacific Aquaculture Regulations introduced as DFO assumes primary responsibility for aquaculture in BC

2011

Gardner Pinfold independent performance review of WSP implementation released

2012

Cohen Commission releases report with 75 recommendations, including 8 directing DFO to act further on WSP

•

Changes to the *Fisheries Act*

2016-2017

WSP implementation consultations with First Nations, key partners and the public

2018

Changes to the *Fisheries Act*

•

WSP 2018-2022 Implementation Plan published

2019

Annual Report on WSP implementation anticipated

2020

WSP Implementation Plan updates to include *Fisheries Act* program changes, as required

2022

5-year review of WSP 2018-2022 Implementation Plan to be undertaken

2023 & Beyond

Ongoing implementation of WSP

WSP Implementation Tools & Resources

Policy and General Information

Wild Salmon Policy (2005) <http://waves-vagues.dfo-mpo.gc.ca/Library/315577.pdf>
Fisheries and Oceans Canada <http://www.dfo-mpo.gc.ca/index-eng.htm>

Data Tools

NuSEDS <https://open.canada.ca/data/en/dataset/c48669a3-045b-400d-b730-48aafe8c5ee6>
 DFO stores up-to-date information on the number and identity of CUs in the New Salmon Escapement Database System (NuSEDS), which holds data on adult salmon escapement. This centralized database is available to the public through the Government of Canada's Open Data Portal. As the numbers and boundaries of CUs change over time, the database will be updated.

Pacific Salmon Explorer www.salmonexplorer.ca
 The Pacific Salmon Explorer gives a high-level overview of salmon CUs, salmon abundance, status and trends over time, and cumulative pressures on freshwater and estuarine salmon habitats.

Published Research

Canadian Science Advisory Secretariat (CSAS) <http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm>
 This site houses CSAS publications dating back to 1977, and publishes the science advisory schedule.

Canadian Technical Report of Fisheries and Aquatic Sciences <http://waves-vagues.dfo-mpo.gc.ca/Library/40617944.pdf>
 State of the physical, biological and selected fisheries resources of Pacific Canadian marine ecosystems in 2016.

Government of BC's Environmental Information Resources System for Biodiversity (EIRS BDP) <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/libraries-publication-catalogues/eirs-biodiversity>
 This database contains a range of environmental and natural resource information, including publications on British Columbia's species and their habitats. Including:

http://docs.streamnetlibrary.org/BC_MELP/WRTechnicalCircular-12.pdf

A Framework for Conducting Effectiveness Evaluations of Watershed Restoration Projects
 Guidelines for Planning Watershed Restoration Projects

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.535.3815&rep=rep1&type=pdf>

The Keogh and Waukwaas Rivers Paired Watershed Study for B.C.'s Watershed Restoration Program: Juvenile Salmonid Enumeration and Growth 1997

Programs

Aquaculture <http://www.dfo-mpo.gc.ca/aquaculture/science-eng.html>
 Aquaculture science and research website.
<http://www.pac.dfo-mpo.gc.ca/aquaculture/index-eng.html>
 DFO's Aquaculture in British Columbia website outlines the regulations, environmental management requirements and compliance and monitoring activities that are in place to ensure that the industry operates in a sustainable manner.
<http://www.dfo-mpo.gc.ca/science/aah-saa/species-especies/aq-health-sante/prv-rp-eng.html>
 Detailed and up-to-date information on heart and skeletal muscle inflammation (HSMI) and piscine reovirus (PRV).

Fisheries <http://www.dfo-mpo.gc.ca/fisheries-peches/index-eng.htm>
Fisheries Protection Program (FPP) <http://www.dfo-mpo.gc.ca/pnw-ppe/fpp-ppp/index-eng.html>
Recreational Fisheries Conservation Partnerships Program <http://www.dfo-mpo.gc.ca/pnw-ppe/rfccpp-ppcpr/index-eng.html>

WSP Implementation Tools & Resources

Programs

Salmonid Enhancement Program (SEP)	http://www.pac.dfo-mpo.gc.ca/sep-pmvs/index-eng.html
• SEP Community Advisors	http://www.pac.dfo-mpo.gc.ca/sep-pmvs/advisors-conseillers/index-eng.html
• Resource Restoration Unit	http://www.pac.dfo-mpo.gc.ca/sep-pmvs/projects-projets/index-eng.html
• Fish Habitat Restoration Initiative	http://www.dfo-mpo.gc.ca/pnw-ppe/rfccpp-ppcpr/index-eng.html
• Coastal Restoration Fund	http://dfo-mpo.gc.ca/oceans/crf-frc/index-eng.html
Species at Risk	http://www.dfo-mpo.gc.ca/species-especes/sara-lep/index-eng.html
Oceans Program	http://www.pac.dfo-mpo.gc.ca/oceans/index-eng.html
Science and Research	http://www.dfo-mpo.gc.ca/science/index-eng.htm

Agreements and Regulations Impacting Wild Pacific Salmon

Fisheries Act Updates	http://www.dfo-mpo.gc.ca/campaign-campagne/fisheries-act-loi-sur-les-peches/proposed-propose-eng.html
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Key BC Legislation

• <i>BC Water Sustainability Act</i>	http://www.bclaws.ca/civix/document/id/complete/statreg/14015
• BC Riparian Areas Regulation	http://www.bclaws.ca/civix/document/id/complete/statreg/376_2004
• <i>BC Forest and Range Practices Act</i>	http://www.bclaws.ca/civix/document/id/consol17/consol17/00_02069_01
• <i>BC Oil and Gas Activities Act</i>	http://www.bclaws.ca/Recon/document/ID/freeside/00_08036_01

BC Treaty Commission Website and Final Agreements

• BC Treaty Commission Website	http://www.bctreaty.ca/
• Nisga'a Final Agreement	http://www.nnkn.ca/files/u28/nis-eng.pdf
• Tsawwassen Final Agreement	http://www.bctreaty.ca/sites/default/files/Tsawwassen_final_initial_1.pdf
• Maa'nulth Final Agreement	http://www.bctreaty.ca/sites/default/files/Maanulth_final_intial_Dec06_1.pdf
• Tla'amin Final Agreement	http://www.bctreaty.ca/sites/default/files/Tlaamin-Final-Agreement_Initialled_1.pdf

Key Yukon Legislation Impacting Wild Salmon

• <i>Yukon Environment Act</i>	http://www.gov.yk.ca/legislation/acts/environment_c.pdf
• <i>Yukon Waters Act</i>	http://www.gov.yk.ca/legislation/acts/waters.pdf
• <i>Yukon Forest Resources Act</i>	http://www.gov.yk.ca/legislation/acts/fore_c.pdf

Yukon First Nations

• Yukon First Nations Final Agreements	https://www.cyfn.ca/agreements/first-nations-final-agreements/
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Species at Risk Act (SARA)

Public Registry	www.sararegistry.gc.ca
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Steelhead

Provincial Framework for Steelhead Management in British Columbia	http://www.env.gov.bc.ca/fw/fish/docs/Provincial-Framework-for-Steelhead-Management-in-BC-April-2016.pdf
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DFO Species Information

http://www.dfo-mpo.gc.ca/species-especes/profiles-profils/steelheadtrout-saumonarcenciel-thompson-eng.html

Cohen Commission

The Cohen Response	http://www.dfo-mpo.gc.ca/cohen/summary-summaire-eng.htm Includes a summary of actions taken on the Cohen Commission recommendations.
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Cohen Commission Report

http://publications.gc.ca/site/eng/432516/publication.html The Final Report of the Cohen Commission of Inquiry into the Decline of Sockeye Salmon on the Fraser River released in 2012.

Glossary

Anadromous fish: Species that migrate from marine to freshwater environments to spawn.

Anthropogenic: of, relating to, or resulting from the influence of human beings on nature.

Aquaculture: The farming of aquatic organisms in the marine environment or freshwater.

Benchmark: A standard (quantified metric) against which habitat or population status can be measured or judged and by which status can be compared over time and space to determine the risk of adverse effects. For instance, biological benchmarks demarcate zones of population status based on conservation and production considerations (Holt and Irvine 2013).

Biodiversity or biological diversity: The full range of variety and variability within and among living organisms and the ecological complexes in which they occur; encompasses diversity at the ecosystem, community, species, and genetic levels and the interaction of these components.

Biogeographic distribution: The distribution of species and ecosystems in geographic space and through geological time.

Biosecurity: procedures intended to protect humans, animals or the larger environment against disease or harmful biological agents.

Bycatch: The unwanted, non-target or discarded fish and other marine creatures caught during commercial fishing activities.

Closed Containment Aquaculture System: Any system of fish production that creates a controlled interface between the cultured animal and the external natural environment (eg. land based aquaculture farms).

Conservation: The protection, maintenance, and rehabilitation of genetic diversity, species, and ecosystems to sustain biodiversity and the continuance of evolutionary and natural production processes.

Conservation Unit (CU): A group of wild salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to re-establish naturally within an acceptable

timeframe (eg. a human lifetime or a specified number of salmon generations).

COSEWIC: Committee on the Status of Endangered Wildlife in Canada; an independent advisory panel to the Minister of Environment and Climate Change Canada that meets twice a year to assess the status of wildlife species at risk of extinction. Members are wildlife biology experts from academia, government, non-governmental organizations and the private sector responsible for designating wildlife species in danger of disappearing from Canada.

Cumulative effects: Changes to environmental, social and economic values caused by the combined effect of past to present activities and events. Within a WSP context, status changes to wild salmon conservation units and the ecosystem units required to sustain them are key cumulative effects indicators.

Ecosystem: A community of organisms plus physical and chemical conditions of their environment interacting as an ecological unit.

Ecosystem-based approach: A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way; conservation of ecosystem structures, processes and interactions through sustainable use.

Ecosystem integrity: The physical, chemical and biological structure and processes that characterize specific ecosystems.

Ecosystem values: Attributes or properties of ecosystems that society wishes to sustain. Freshwater ecosystem integrity, salmon biodiversity and sustainable fisheries for salmon are examples of ecosystem values within a WSP context.

Enhancement: The application of biological and technical knowledge and capabilities to increase the productivity of fish stocks. It may be achieved by altering habitat attributes (e.g. habitat restoration) or by using fish culture techniques (e.g. hatcheries, spawning channels). In the context of the WSP, only

salmon originating directly from hatcheries and managed spawning channels will be considered enhanced.

Epigenetic: Heritable changes in gene function that do not involve changes in the DNA sequence.

Escapement: The number of mature salmon that pass through (or escape) fisheries and return to fresh water to spawn.

Extirpation: The local extinction of a species.

Flora and Fauna: Plant life and animal life, respectively.

Fecundity: The number of eggs an animal produces during each reproductive cycle; the potential reproductive capacity of an organism or population (similar to fertility).

Fish habitat: Spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.

Fishery Reference Point (FRP): A point at which management actions occur. An example is the abundance of returning adults above which targeted harvest is considered. A limit reference point and an upper reference point define the boundaries for managing to protect stock status. FRPs are distinct from biological benchmarks.

Fry: Salmon that have emerged from gravel, completed yolk absorption, remained in freshwater streams, and are less than a few months old.

Genetic diversity: The variation at the level of individual genes, and provides a mechanism for populations to adapt to their ever-changing environment. It refers to the differences in genetic make-up among distinct species and to genetic variations within a single species.

Genetic traits: Characteristics or attributes of an organism that are expressed by genes and/or influenced by the environment. Traits include physical attributes and behavioural characteristics.

Glossary

Habitat restoration: Physical or chemical manipulations to create a natural or normative reference state of habitat that has been altered, disrupted, or degraded. Successful restoration increases the capability of previously damaged habitat to sustain fish production.

Indicator species: A species whose presence, absence or abundance, relates to a specific environmental condition.

Integrated Fisheries Management Plans (IFMPs): are used by DFO to guide the conservation and sustainable use of marine resources. An IFMP is developed to manage the fishery of a particular species in a given region. IFMPs combine the best available science on a species with industry data on capacity and methods for harvesting that species.

Invasive species: A plant, fungus or animal species that is not native to a specific location and has negative effects on our economy, environment and/or health.

Keystone species: A species that has a disproportionately large effect on its environment relative to its abundance. Such species are described as playing a critical role in maintaining the structure of an ecological community, affecting many other organisms in an ecosystem and helping to determine the types and numbers of various other species in the community. Pacific salmon are regarded as keystone species due to their disproportionate impact as sources of food and nutrients that demonstrably limit the distribution and abundance of a wide range of both plant and animal species in freshwater and associated terrestrial ecosystems.

Lower benchmark: A reference point in biological status associated with significant losses in production between the Amber and Red zones, and which allows for a substantial buffer between it and any level of abundance that could lead to a CU being considered at risk of extinction.

Metric: A quantifiable measure.

Multi-trophic: A trophic level is a functional classification of organisms in a community according to feeding relationships. Ecosystems contain multiple trophic levels consisting of plants, grazers, predators, scavengers etc.

Natal stream: Specific locality of birth of a fish or other aquatic animal.

Pathogen: A bacterium, virus or other microorganisms that can cause disease.

Pelagic: Related to, living, or occurring in the open-ocean.

Population: A group of interbreeding organisms that is relatively isolated (i.e. demographically uncoupled) from other such groups and is likely adapted to the local habitat.

Precautionary approach: When used in an advisory context in support of decision-making by the Government of Canada, this term conveys the sense that the advice is provided in situations of high scientific uncertainty. It is intended to promote actions that would result in a low probability of harm that is serious or difficult to reverse.

Predator-scavenger complex (PSC): An ecological community consisting of many species of animals that obtain a significant portion of their seasonal to annual food requirements by killing or scavenging and then eating a common species. In British Columbia the salmon PSC comprises at least 23 species of mammals and birds that consume adult fish returning to British Columbia rivers and streams.

Productivity: A measure of the amount of energy (or material) formed by an individual population or community in a specific amount of time. Within a WSP context, some common measures of productivity include the number of fry, smolts or subsequent adults (i.e. recruits) produced on average per spawning adult of the previous generation.

Resource management: Departmental actions, policies and programs affecting wild Pacific salmon directly or indirectly through their habitats and ecosystems.

Returns: Total number of adults returning to freshwater to spawn in a given year, including those caught in fisheries.

Riparian: Pertaining to anything connected to with or adjacent to the bank of the stream or other body of water.

Salmonid: A group of fish that includes salmon, trout, and char, belonging to the taxonomic Family Salmonidae.

Spawner: A reproductively mature individual fish returning to freshwater to spawn.

Species: The fundamental category of taxonomic classification consisting of organisms grouped by virtue of their common attributes and capable of interbreeding. A taxonomic species is equivalent to the term “species” but the phrase may be used to indicate the collective species throughout its distribution.

Stewardship: Acting responsibly to conserve fish and their habitat for present and future generations.

Stock assessment: The use of various statistical and mathematical calculations to make quantitative predictions about the reactions of fish populations to alternative management choices.

Terminal fisheries: Fisheries that occur near or in fresh water (e.g. at a river’s mouth) where the targeted species or stock has returned to spawn.

Wild salmon: Salmon are considered “wild” if they have spent their entire life cycle in the wild and originate from parents that were also produced by natural spawning and continuously lived in the wild.

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Fall, 2018

Sustaining
Salmon *for*
Generations



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