



Speaking for the Salmon

The Protection of Pacific Wild Salmon:
Understanding potential risk factors and seeking solutions

RECOMMENDATIONS

from a think tank of scientists

January 2017



INTRODUCTION

The Canadian government has committed to science-based decision-making for the conservation and sustainable management of fish and fisheries, including wild Pacific Salmon. As prescribed in his 2015 mandate letter¹ to the Minister of Fisheries, Oceans and the Canadian Coast Guard, Canada's Prime Minister laid out these priorities:

“[P]rotect our three oceans, coasts, waterways and fisheries and ensure that they remain healthy for future generations.”

“Use scientific evidence and the precautionary principle, and take into account climate change, when making decisions affecting fish stocks and ecosystem management.”

“[E]nsure that decisions are based on science, facts, and evidence, and serve the public interest.”

Scientists and experts from academic, First Nations, industry, non-profit organizations, and government from Western Canada, Atlantic Canada, Norway, Ireland, Iceland, and the United States met at Simon Fraser University on January 26 and 27, 2017. Our goal was to pool expertise to assess the status of Pacific Salmon, and to advance opportunities for science-based management to address their multiple stressors. Here we offer new scientific findings and recommendations to Canada's Government that we believe will help them fulfill their stated commitments as they apply to the management and conservation of wild Pacific Salmon.

PART 1. STATUS OF SALMON AND SALMON SCIENCE

The productivities of most species and populations of Pacific salmon in their southern range, including those throughout British Columbia, have generally declined since approximately 1990^{2,3}. The commonality of this broad pattern points to large-scale changes in a shared environment, specifically the ocean, in controlling these broad patterns. For example, ocean environmental conditions as well as competition are linked to marine survival^{2,4,5}.

While many salmon stocks have decreased and fisheries have suffered, Canada still boasts a remarkable diversity of Pacific salmon, with hundreds of locally adapted populations throughout British Columbia. There have also been bright spots in the status of Canadian Pacific salmon, such as record returns of chum salmon and Barkley Sound sockeye in 2016, improved production of Interior Fraser River coho salmon in recent years, and increasing returns of Yukon River Chinook salmon in the past two years.

Accurate information on the abundance of salmon is the foundation of our scientific understanding and effective management of wild salmon populations. However, over the last 20 years, the total number of streams where salmon were counted on BC's North and Central Coast has decreased from approximately 1000/year to approximately 500/year, and only 50% of key indicator streams were surveyed in 2014 and 2015⁶. While DFO and their contractors have decreased their efforts over the

last several decades, First Nations fisheries programs have ramped up theirs, and now lead the majority of stream surveys in the North and Central Coast. These latter programs are essential to maintain detailed local knowledge of salmon and their habitat, especially in the Central Coast. The on-going erosion of salmon population monitoring undermines effective science-based management. There is a pressing need to reinvest in annual monitoring of salmon streams, and there is an opportunity to collaborate with First Nations in delivering this work. The indicator streams, survey methods, survey costs, and First Nations interested in conducting these surveys have been identified for all salmon species returning to streams on BC's North and Central Coasts. Similar work should be completed for BC's South Coast streams, including the Fraser River system.

Finding 1:

Canadian Pacific salmon are likely not as resilient as they have been in the past, but still possess the capacity to thrive, given proper stewardship.

Finding 2:

There has been a dramatic erosion of monitoring of spawning salmon over the last 20 years with the total number of streams where salmon were counted on BC's North and Central Coasts having decreased by half⁶.

Recommendation 1:

Implement Canada's Wild Salmon Policy⁷. The Wild Salmon Policy (2005) was created by Fisheries and Oceans Canada to guide successful salmon stewardship. It took a decade to develop, and was finalized twelve years ago—but never fully implemented by the Federal Government. Recently, the non-profit Pacific Salmon Foundation has developed a model implementation of the Wild Salmon Policy for the second-largest salmon watershed in Canada, the Skeena River (the Pacific Salmon Explorer⁸). There is an opportunity to build on this success and effectively apply the Explorer to other salmon watersheds. Further reviewing, reexamining, or reopening of the policy would be a poor

use of limited funds in the Pacific Region. The Wild Salmon Policy is more timely and important than ever and it should be fully implemented immediately.

Recommendation 2:

Invest core funding for long-term assessment of salmon populations. The federal government should develop a salmon monitoring network throughout the range of Pacific salmon, consistent with the Wild Salmon Policy, executed annually with First Nations and community organizations. The Federal Government should also maintain a central data archive for open sharing of information (modeled on the Pacific Salmon Explorer⁸).

PART 2. AQUACULTURE AS A POTENTIAL STRESSOR OF WILD SALMON

Following the two-decade decline and 2009 collapse of Fraser River sockeye salmon that triggered the \$37 million Cohen Commission⁹, the 2016 return of sockeye to the Fraser River was the worst ever recorded. In 2012, Justice Cohen made eleven aquaculture-related recommendations for the conservation and management of these iconic fish. The Commission identified salmon farming as a credible threat to wild salmon, and we have learned new information that increases our concern about this threat^{10–12}. The key issue from aquaculture is the amplification and transfer of pathogens and parasites to vulnerable wild salmon from farms sited on main migration routes of wild salmon. Although aquaculture has ceased to expand in the Discovery Islands (as recommended by Cohen), it has expanded further north on the same migration route of Fraser River salmon. While *Lepeophtheirus salmonis* (sea lice) remains a significant concern, new concerns have arisen regarding other pathogens, including *Caligus clemensi* (another species of sea louse), *Piscirickettsia salmonis* (bacteria), piscine retrovirus, parvovirus, and infectious salmon anemia virus. At the same time, there has been rapid technological innovation and growth in closed-containment technologies that eliminate many or all of these pathogen concerns.





Finding 3:

There is now irrefutable evidence linking piscine retrovirus (PRV) to heart and skeletal muscle inflammation (HSMI)¹¹, a serious disease found in BC farmed salmon^{13,10}. There is also published correlational evidence linking PRV to reduced fitness in wild BC salmon¹¹.

Finding 4:

Detrimental effects of sea lice are more apparent, including unequivocal evidence of sea lice negatively impacting population recruitment of wild salmonids in the Atlantic Ocean¹⁴ and sublethal effects of *Caligus clemensi* on the foraging success and growth of Pacific juvenile sockeye salmon¹⁵.

Finding 5:

Through the DFO-led Strategic Salmon Health Initiative, we are now aware of a much higher diversity of pathogens that exist in wild Pacific salmon that can be shared with and potentially amplified by farmed fish¹¹.

Recommendation 3:

Implement relevant recommendations regarding aquaculture from the Cohen Commission to Fraser River sockeye salmon as well as other species and stocks in British Columbia.

Recommendation 4:

New, transparent, science-based criteria for siting farms are needed, including their location relative to salmon migration routes. These criteria should also apply to existing farms and may entail relocation or removal.

Recommendation 5:

Canada should implement initiatives employed elsewhere (e.g., in Norway), including protected areas, regional limits on sea lice levels, regulation of aquaculture production according to sea lice impacts on wild salmon, and economic incentives to industry for reducing pathogen transmission (e.g., green licenses and barriers such as closed-containment).

Recommendation 6:

DFO should support and expand their comprehensive screening platform for salmon pathogens, and the monitoring results of wild and farmed fish should be available to non-government scientists.

PART 3. POLICIES AND PARTNERSHIPS

The Federal Government has committed to examining several key policies and partnerships that apply to the conservation and management of wild salmon. Fulfilling these broader commitments would help the Federal Government achieve their commitments to Pacific salmon.

Recommendation 7:

Restore lost protections to the Fisheries Act, Navigable Waters Act, and the Canadian Environmental Assessment Act. Intact habitat is the foundation for healthy salmon populations.

Recommendation 8:

Separate the promotion of aquaculture from the protection of wild fish into separate ministries, as recommended by the Cohen Commission⁹ and the Expert Panel from the Royal Society of Canada¹⁶. This separation must come from the Federal Government, not the Department of Fisheries and Oceans. This separation would help remove the conflicting mandate of aquaculture promotion and protection of wild salmon, and it would enable DFO to make science-driven decisions and help restore credibility and trust.

Recommendation 9:

Undertake good-faith consultation, accommodation, collaboration, and support of a meaningful First Nations' role in salmon management. The Prime Minister has stated that "no relationship is more important to me and to Canada than the one with Indigenous Peoples" and Canada is a signatory of the United Nations Declaration on the Rights of Indigenous Peoples. As workshop participant Chief Bob Chamberlin stated: "salmon is everything." There is a real opportunity to support local capacity for salmon stewardship,

improve the scientific basis of salmon management, and make a positive step towards reconciliation.

CONCLUSIONS

A major component in the future development and protection of Yukon and B.C. social-cultural values is the sound management of wild salmon. In the continued quest for prosperity, the management of B.C.'s wild Pacific salmon has been compromised. If this continues, there will ultimately be extensive and long-lasting consequences to 'Beautiful B.C.' and our cultures associated with Pacific salmon.

Importantly, we already have the policy to protect salmon⁷ and we have a large number of communities committed to the restoration of salmon and their habitats. Pacific salmon can be highly resilient. We still retain the resource base (genetic diversity) for their continued evolution and future production. This capacity for adaptation will be increasingly important as the effects of climate change escalate. Healthy, diverse populations of salmon (as envisaged under the Wild Salmon Policy⁷) reduce risks to the array of pressures they face^{17–19}; maintaining this diversity is an achievable management objective that all communities can support and engage in. But government agencies need to restore their commitment to wild Pacific salmon as a priority⁷, recognize the opportunities before them, and enable us all to collaborate.

We believe that these 9 recommendations represent opportunities to achieve the stated commitments of the Federal government to science-based management and conservation. Please consider us allies and resources in achieving these ambitious and exciting commitments.

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This report is based on the proceedings of the think tank and was compiled by the Steering Committee with lead authors: Dr. Jonathan Moore, Dr. Arne Mooers and Dr. Patricia Gallagher.

The presentations and video resources from the gathering are available at <http://www.sfu.ca/coastal/research-series/listing/SpeakingfortheSalmon.html>

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SPEAKING FOR THE SALMON PROGRAM

The Speaking for the Salmon Program was launched in 1998 with the aim of examining issues impacting the survival of wild salmon in British Columbia. Over 30 gatherings have taken place and have included community workshops, scientists' think tanks, town hall meetings, dialogues and public presentations. Linking Science with local knowledge to help guide policy, projects have addressed issues from a range of topics including :

- Implementing Cohen Commission Recommendations,
- Uncertainty and Fraser Sockeye Salmon,
- Pathogens and Diseases in Pacific Salmon,
- Sustainable Salmon Aquaculture,
- Wild Salmon Policy,
- Ground Water and Salmon,
- Status of Stocks and Habitat,
- Nutrients and Salmon Production,
- Hatcheries and Wild Salmon,
- Stock Selective Salmon Harvesting,
- Transferable Shares and more.

To view reports and resource materials from these gatherings visit:

<http://www.sfu.ca/coastal/research-series/listing/SpeakingfortheSalmon.html>

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