Pacific Fisheries Resource Conservation Council

Annual Report 2007

Pacific Fisheries Resource Conservation Council

July 2008

Annual Report 2007 Pacific Fisheries Resource Conservation Council

For quotes and short excerpts from the material covered under "fair use", we recommend the following citation:
PFRCC. 2008. Annual Report 2007. Vancouver, BC: Pacific Fisheries Resource Conservation Council.

For further information about this document and about the Pacific Fisheries Resource Conservation Council (PFRCC), contact:
Pacific Fisheries Resource Conservation Council
290 – 858 Beatty Street
Vancouver, BC V6B 1C1
CANADA
Telephone 604 775 5621
Fax 604 775 5622
www.fish.bc.ca
info@fish.bc.ca

Printed and bound in Canada

ISBN 1-897110-42-1

Pacific Fisheries Resource Conservation Council
Conseil pour la conservation des ressources halieutiques du pacifique

May 2008

The Honourable Barry Penner
Minister of Environment
Province of British Columbia
Legislative Building
Victoria

The Honourable Loyola Hearn
Minister of Fisheries and Oceans
Government of Canada
House of Commons
Ottawa

Dear Ministers:

This is the report provided to you annually by the Pacific Fisheries Resource Conservation Council. In it we summarize the work we performed in 2007, and provide you with our perspectives on the threats, improvements and trends that are impacting wild Pacific salmon stocks and their freshwater and ocean habitats.

In the past year we produced and commissioned several reports that contributed to the improvement of public understanding and resource management activities related to the ocean and freshwater environments for salmon. Those reports are summarized here, as well as explanations of the outcomes of community meetings, briefings, and discussions with senior federal and provincial government officials.

With regret we accepted the resignation of our Council colleague Merrill Fearon. She made a significant contribution to our conservation work, especially in the development of the website and educational programs. Merrill's departure left the Council with two vacancies for most of the year; the consequence was a considerably increased workload for the remaining Council members.

Also in 2007, we relocated our office, moving to the Yaletown area of Vancouver. We adopted a new look for the Council's website and design for background reports and advisories. We continued to hold a series of well-attended community meetings around the province, and generated extensive and positive news media coverage about the issues and problems related to salmon.

We are now entering the Council's tenth year. We plan to mark the anniversary of the Council's September 18, 1998 establishment with a retrospective and a review of the priorities for salmon conservation.

Our Council colleagues join us in presenting this report that we hope will help advance the interests of Pacific salmon conservation.

Paul LeBlond
Chair

Mark Angelo
Deputy Chair

290 - 858 Beatty Street
Vancouver. British Columbia

Tel/Tel: (604) 775-5621
Fax/Tele: (604) 775-5622
E-mail: info@ fish.bc.ca

290 - 858 rue Beatty
Vancouver. Colombie-Britannique

Pacific Fisheries Resource Conservation Council
Conseil pour la conservation des ressources halieutiques du pacifique

Mai 2008

L'honorable Barry Penner
Ministre de l'Environnement
Province de la Colombie-Britannique
Édifice de l'Assemblée législative
Victoria

L'honorable Loyola Hearn
Ministre des Pêches et des Océans
Gouvernement du Canada
Chambre des communes
Ottawa

Messieurs,

Vous trouverez ci-joint le rapport annuel du Conseil pour la conservation des ressources halieutiques du Pacifique concernant l'année 2007. Ce rapport fait état de nos activités et de notre opinion concernant les dangers et les améliorations que nous avons constatés et les phénomènes qui ont un impact sur les stocks de saumon sauvage du Pacifique et sur leurs habitats marins et dulcicoles.

Au cours de la dernière année, nous avons produit et commandé plusieurs rapports d'études qui ont contribué à mieux informer le public et les gestionnaires de la ressource concernant l'environnement marin et dulcicole du saumon. Ces rapports d'études sont résumés ci-après, ainsi que les résultats des rencontres, des séances d'information et des discussions que nous avons eues avec les responsables des gouvernements fédéral et provincial.

C'est avec regret que nous avons accepté la démission de notre collègue Merrill Fearon. M^{me} Fearon a grandement contribué à notre travail de conservation, en particulier au développement de notre site web et de nos programmes d'éducation. Avec son départ, le Conseil a été à court de deux ressources pendant la plus grande partie de l'année, ce qui a occasionné un important surcroît de travail pour le reste de l'équipe.

Signalons également que nous avons déménagé pour nous réinstaller dans le secteur de Yaletown à Vancouver, et que nous avons relooké notre site web ainsi que la toile de fond des rapports et des avis que nous publions. Nous continuons à organiser des rencontres publiques à travers la province, lesquelles attirent un grand nombre de participants et un intérêt considérable et positif de la part des médias dès lors qu'il s'agit des enjeux et des problèmes qui concernent le saumon.

Le Conseil entame maintenant sa dixième année d'existence. Nous prévoyons souligner l'anniversaire de notre création (18 septembre 1998) en faisant une rétrospective et un examen des priorités concernant l'état de conservation des stocks de saumon.

Au nom de tous les membres du Conseil, nous vous présentons ce rapport en espérant qu'il contribuera à promouvoir la conservation du saumon du Pacifique.

Paul LeBlond
Président

Mark Angelo
Vice-président

290 - 858 Beatty Street
Vancouver. British Columbia

Tel/Tel: (604) 775-5621
Fax/Tele: (604) 775-5622
E-mail: info@ fish.bc.ca

290 - 858 rue Beatty
Vancouver. Colombie-Britannique

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Wild salmon returns in British Columbia were generally very poor in 2007, with exceptionally low abundance in some crucial stocks and areas of the province. Poor ocean conditions were primary contributors to the situation, complicated by persistent weakness in the numbers of some of the most valued salmon runs. As a result, salmon fishing was restricted for conservation purposes in many instances.

During 2007, the Pacific Fisheries Resource Conservation Council continued to identify and help introduce strategies to protect and rebuild wild salmon stocks, and to maintain productive habitat for spawning and rearing salmon.

The Council expanded its *"What's Happening to Wild Salmon in Your Community"* series of events, working with community members to determine local issues and solutions in areas across the province. Council members noted the increasing participation and news media coverage of these community meetings.

The activities and publications of the Council are meant to inform the public and government officials about emerging issues, rather than address immediate crisis situations. Its role is to help build awareness and provide realistic options to ensure the sustainability of wild salmon and their continuation as a thriving natural resource, symbolic of British Columbia.

The Council's report in 2007 on an ecosystem management approach was meant to foster the inclusion of more significant factors into salmon management regimes, specifically to emphasize that single-species management has not worked and that new approaches are needed to conserve salmon.

The background paper and case studies related to climate change and freshwater habitats presented valuable information on how the impacts are being felt in several instances, and how effective measures, such as protecting streamside vegetation, can be taken to help salmon cope with climate change.

The background paper on the Heart of the Fraser presented a large-scale perspective on fish habitat in one of the most productive and crucial areas of the province for salmon. The report proposed action, specifically the striking of a multi-sectoral task force to manage this section of the river, to protect this area from further deterioration, and is being given serious consideration by the provincial government.

During 2007 and into 2008, the Council has also been providing information and advice regarding the Wild Salmon Policy, examinations of how climate impacts the salmon's marine environment, predictive modeling for salmon, and legislative initiatives in anticipated amendments to the Fisheries Act and BC Water Act. The Council also contributed to the effort to develop a more comprehensive, multi-participant ecosystem research program focused on the Strait of Georgia, addressing climate change and other major trends affecting wild salmon.

In wrapping up its long-term consideration of hatcheries and enhancement, the Council commented on the need for more focused and question-driven research to help improve hatchery operations and enhancement activities.

RÉSUMÉ

En 2007, les remontes de saumon sauvage dans les cours d'eau de la Colombie-Britannique ont généralement été très décevantes, indiquant une baisse d'abondance exceptionnelle pour certains stocks et certains secteurs d'importance cruciale. Les conditions océanes défavorables ont été le principal facteur qui a contribué à cette situation, laquelle a été compliquée par le déclin persistent des effectifs dans certaines des remontes ayant un intérêt particulier pour la province. Avec pour conséquence que des mesures de restriction ont dû être imposées sur plusieurs pêcheries, pour cause de conservation.

Durant l'année 2007, le Conseil pour la conservation des ressources halieutiques du Pacifique a continué de participer à l'établissement de stratégies visant à protéger et à reconstruire les stocks de saumon sauvages, et à maintenir des habitats productifs pour les saumons en phase de frai et en phase de croissance.

Le Conseil a développé son programme d'activité intitulé « *What's Happening to Wild Salmon in Your Community* » en travaillant avec les acteurs locaux pour déterminer les problèmes et dégager des solutions concernant chaque région particulière. Les membres du Conseil ont constaté que ces rencontres locales suscitent une participation et une couverture médiatique de plus en plus importantes.

Les activités et les publications du Conseil visent à informer le public et les responsables gouvernementaux sur les problèmes émergents plutôt que sur les situations de crise survenant dans l'immédiat. Notre rôle est de sensibiliser et de proposer des solutions réalistes pour assurer la pérennité et la vitalité des stocks de saumon sauvage en tant que ressource naturelle emblématique de la Colombie-Britannique.

Le rapport que nous avons publié en 2007 concernant l'approche de gestion écosystémique visait à promouvoir la prise en compte de facteurs plus significatifs dans le régime de gestion adopté, et plus spécifiquement à attirer l'attention sur le fait que la stratégie de gestion monospécifique n'a pas donné les résultats escomptés, et qu'il est temps d'adopter de nouvelles approches.

Le document d'information et les études de cas que nous avons publiés concernant le changement climatique et les habitats dulcicoles contenaient des informations très utiles sur les impacts qui se font sentir et sur les mesures qui peuvent être prises, comme la protection de la ripisylve, pour aider le saumon à résister aux effets du changement climatique.

Le document d'information concernant le « cœur du Fraser » a donné une perspective à grande échelle de la situation de l'habitat piscicole dans l'un des écosystèmes les plus productifs et les plus importants de la province pour les populations de saumon. Le rapport a proposé divers moyens d'action, notamment l'établissement d'un groupe de travail multisectoriel qui pourrait être chargé de gérer cette section du fleuve Fraser afin de la protéger d'une plus grande détérioration. Cette proposition est sérieusement étudiée par le gouvernement provincial.

Au cours de 2007 et au début de l'année 2008, le Conseil a également fourni de l'information et des conseils sur la politique concernant le saumon sauvage; il a aussi étudié les impacts du climat sur l'environnement marin du saumon et proposé des modèles prédictifs ainsi que des actions législatives pour modifier la *Loi sur les pêches* et le *BC Water Act*.

Dans la conclusion de son examen stratégique des écloseries et autres dispositifs d'aménagement salmonicoles, le Conseil a mentionné qu'il était nécessaire de faire des études plus pointues et plus rigoureuses pour aider notamment à améliorer les installations d'écloserie et les activités d'aménagement de la ressource.

1. SALMON CONSERVATION OVERVIEW

By most measurement criteria, the year 2007 would be characterized as a "bad" one for wild Pacific salmon returns. In some crucial areas salmon returns were severely depressed, relative to historical levels and expectations. Fishing opportunities were restricted in several instances for conservation purposes, affecting all sectors of the fisheries—commercial, recreational and First Nations.

The management plans of both Fisheries and Oceans Canada and BC Fisheries took into account the expected poor returns for sockeye and steelhead in some river systems and areas of the province. The reduced overall harvest and timing restrictions to protect Cultus Lake sockeye, for example, were meant to help rebuild those stocks that have become persistently depressed in abundance.

Restrictions to protect weaker stocks were also applied to West Coast Vancouver Island chinook and Interior Fraser coho. The Early and Late Stuart sockeye, with their long river migration route, also continued to be weak and vulnerable populations.

The poor returns of Skeena River steelhead continued a trend of recent years, and are troubling in light of previous strength and consistency of steelhead returns.

Unlike other years of disappointing returns, the problems of the salmon fisheries in 2007 became apparent in the early stages of the season, indicating poor ocean survival as a predominant factor.

The fishing plans of the regulatory agencies for 2007 had been based on assumptions of relatively average conditions, with the notable exceptions just mentioned, as well as projected low to moderate returns of Fraser River sockeye and poor returns of Strait of Georgia chinook. As the test fisheries and other indicators of the poor salmon returns were observed, additional conservation measures were quickly introduced.

It should be noted that First Nations communities and fishing organizations also undertake fisheries management initiatives and conservation measures in their own right. These activities, as well as their participation in selective fishing initiatives, are crucial to the future application of effective conservation measures.

The management of salmon populations has become increasingly complex in the face of shifting climate regimes in the North Pacific Ocean and climate-related effects on habitat and freshwater. Many of the assumptions and historical references that have been underpinning the decisions about fishing and other regulation of salmon stocks appear to have become less reliable. The task of managing wild salmon calls for increased precaution and more innovative approaches.

Providing this description of the state of wild salmon stocks and habitat annually and in issue-specific reports is a primary function of the Pacific Fisheries Resource Conservation Council. The mandate of the Council is to provide information and advice on matters dealing with the conservation of Pacific fish populations and the status of their freshwater and ocean habitat.

The Council does not comment on issues of in-season management of the fisheries, nor on the decisions about the allocation of harvest among commercial, recreational and First Nations, except where they may be impacting on conservation.

The objectives of the Pacific Fisheries Resource Conservation Council have remained unchanged since its inception:

- To advise the federal and provincial ministers and the public on critical issues concerning the status and conservation of anadromous salmonids and their habitat. The direct requests by ministers for advice on specific topics are given priority;
- To identify and provide alerts about emerging and critical fisheries conservation issues, based on the collective knowledge and experience of Council members; and
- To become directly engaged in fisheries conservation issues, and to assist government officials and the public in understanding those issues, through the Council's public events, conferences and workshops, and by producing and distributing accessible information in published and electronic forms.

In recent years, the Council has shifted its emphasis away from reports providing detailed stock status descriptions and snapshots of conditions. Instead, the Council has emphasized presenting causal factor information—looking at the underlying reasons for salmon risks. In this way, the Council has been able to make greater value-added contributions to the development of appropriate responses to the conservation challenges facing Pacific salmon and steelhead.

This transition towards the provision of strategic and constructive advice has been deliberate and intended to provide a focus on solutions, rather than reiteration of the magnitude of known problems. At the same time, while the Council recognizes the on-going problems of sea lice and the continuing controversy related to netpen aquaculture, it has maintained a watching brief rather than replicate the work of others in relation to these issues.

At the same time, the Council has instigated its series of public meetings across British Columbia to obtain first-hand information about salmon stock conditions in watersheds and local areas. The information generated in these meetings—and subsequently reported in Council publications—has been especially valuable in pinpointing where salmon conservation responses should be given priority.

2. REVIEW OF REPORTS AND INITIATIVES

During 2007, the Pacific Fisheries Resource Conservation Council implemented its extensive workplan of events and publications. The activities of Council members included public meetings, advisory reports, background papers, and discussions with senior government officials.

The Council also had the benefit of briefings by government officials, academics and others involved in fisheries issues as part of the regular meeting schedule. Among the most notable briefings and discussions was one with Jim Mattison, the Comptroller of Water Rights for the Province of British Columbia, and another with the scientists working on the fisheries research programs in the Strait of Georgia. A meeting of Council members with the federal officials involved in drafting the new federal Fisheries Act was also very instructive, as was the briefing and discussions that dealt with issues of ocean ecology.

2.1 SPRING 2007 COMMUNITY MEETINGS

An important part of the mandate assigned to the Council is to hear from individuals in communities, First Nations, recreational and commercial fishing areas around the province. Local knowledge and perspectives need to be channeled into the understanding and management of wild Pacific salmon.

The PFRCC members have recognized the value of encouraging community dialogue to help shape their strategies and advice to government decision-makers. The theme of the 2007 public meetings in the Skeena watershed was “What’s Happening to Wild Salmon in Your Community”.

The three March 2007 public meetings in the Skeena watershed communities involved 153 participants who were also involved in preceding one-hour open house sessions, poster presentations and opportunities for one-on-one discussions with Council members.

The meetings held in Smithers, Terrace and Prince Rupert were intended to address three objectives: to share information on the natural and human influences on wild salmon; to gather local knowledge from the community; and to compile information and ideas to help PFRCC members develop and provide advice to governments and the public, and shape future Council activities.

The public comments on primary themes and matters of priority interest differed somewhat in each of the communities. However, there were some consistent elements that included:

- Concern about large-scale industrial development projects mainly related to energy and transportation that should be driven by sustainability and more holistic and balanced approaches.
- Strong regional resistance to net pen salmon aquaculture projects.
- Logging impacts on salmon habitat, stream hydrology and water quality.
- Recreational and commercial fishing practices that undermine the ability to manage salmon and steelhead stocks in sustainable ways.
- Fisheries resource management that fails to account adequately for cumulative human impacts and total river capacity.
- Declining resources to enable local monitoring, assessment and stewardship.
- Overlooked emerging impacts on salmon due to climate change.
- Failure to tap local expertise and community knowledge that could be valuable in stewardship and watershed management.

- Perceived lack of will and/or capacity of government fisheries agencies to protect and manage salmon stocks and habitat to the best of their ability.
- Incapability of fisheries management to build ecosystem considerations into their planning and activities.

In the community meetings, the Council members were told that most salmon stocks in the region were doing relatively well compared with elsewhere in the province, with some serious exceptions. Areas of particular concern included: declining chinook returns to upper Skeena tributaries like Morice; some Skeena sockeye stocks, particularly Lakelse Lake sockeye; and steelhead stocks.

Participants in the community meetings cited ways that at least some of the problems are being handled successfully or could be improved in practical initiatives. These included collaborative watershed management approaches, application of holistic ecosystem practices, restoration of adequate salmon assessment programs, adoption of innovative fishing practices, and better fishing and habitat protection enforcement.

The full summary of discussions in these meetings is contained in the Appendix section of this annual report.

2.2 GEORGIA STRAIT ECOSYSTEM MANAGEMENT ADVISORY

Fisheries and Oceans Canada was urged in the Council's June 2007 advisory adopt an ecosystem-based approach to fisheries conservation, and to start with the Strait of Georgia.

Commenting on the report entitled *An Ecosystem Approach to Managing Salmon in the Strait of Georgia*, Council Chair Paul Leblond explained:

> *"The traditional approach to fisheries conservation—considering each species alone in an unchanging sea—needs to give way to an ecosystem-based approach that takes into account the role of environmental conditions and interactions with other species in determining fishing plans and conservation strategies."*

The use the Strait of Georgia as the test location makes sense because of the availability of data and background information on aquatic life and environmental conditions. The Council suggested that, by taking the new approach, there could be a breakthrough in identifying the reasons for the continued depletion of chinook and coho salmon populations. The declines in abundance have been in spite of the strict but conventional regulatory restrictions on salmon and the vast sums of money being spent on stewardship activity, including stream restoration and hatchery supplementation.

The ecosystem issues that should be taken into account include water temperatures, food availability, predators including seals, and competition from other fish. The report went on to explain how new directions are needed in light of the persistent low abundances of some salmon stocks. The prevailing fisheries management regime, while restrictive, seems to be ineffective in too many instances to reverse negative trends, and ecosystem variables should be introduced into stock management decisions.

This advisory report was largely based on the proceedings of a March 2007 workshop held by the Council in Vancouver. It involved several fisheries and environmental specialists in a discussion of how the ecosystem approach could be adopted in the most practical and effective ways.

2.3 PARLIAMENTARY SECRETARY DISCUSSIONS

In July 2007, Council members met with Randy Kamp, the Parliamentary Secretary to the Minister of Fisheries and Oceans. He is the Member of Parliament for Pitt Meadows - Maple Ridge - Mission, and is familiar with fisheries issues from the Pacific coast perspective.

Council members explained the findings and recommendations of some of the most recent reports, and exchanged views with Mr. Kamp on current priorities, including the Wild Salmon Policy and Strait of Georgia ecosystem management. Among the topics was the view of the Council that the Pacific region of Fisheries and Oceans appeared to have insufficient resources to carry out some of its most crucial responsibilities, including habitat enforcement in some instances.

The Parliamentary Secretary was urged to have the Minister fill the two Council membership vacancies soon, since the absence of commercial fishing perspectives at the PFRCC table was especially evident. He was told that the Council, as a ministerial committee, wants to strengthen its dialogue with the Minister and hear from him about the issues he might wish to have the Council address.

The Parliamentary Secretary expressed his hope that the dialogue with Council members would continue on a regular basis. One outcome of the meeting was the invitation to the Chair of the PFRCC to participate in a roundtable session with DFO Minister Loyola Hearn later in the year.

In a subsequent meeting in December with the Parliamentary Secretary, Council members briefed him on the *Heart of the Fraser* report and reiterated the need to proceed with the replacements for the two vacant seats.

2.4 CLIMATE CHANGE AND FRESHWATER HABITATS BACKGROUND PAPER

New approaches in fisheries management and research were put forward in a background paper produced for the Council around key elements to help government decision-makers and local communities decide upon appropriate action in response to climate change.

The report entitled *Helping Pacific Salmon Survive the Impact of Climate Change on Freshwater Habitats: Pursuing Proactive and Reactive Adaptation Strategies* was prepared by ESSA Technologies Ltd., along with a companion document of case studies.

The background paper suggested a four-phased approach:

- Identify issues of concern (clarify setting, competing resource uses, decision makers, issues of interest)
- Assess vulnerability (extent of sensitivity, measureable changes, predictability factors, linkages)
- Summarize assets (knowledge sources, experience, status evaluation, response activity chronicle)
- Describe adaptation strategies (strategies, implementation action, mitigation, compensation, restoration)

The report went on to explain that the strategies can be described in terms of their different focus on flow, temperature, fish and fish habitat—each calling for unique action and forms of attention.

It identified both structural and policy adaptation strategies to help the salmon survive global warming. Structural measures cover engineering and technology innovations that can be implemented at a practical project level. For example, the installation of fish ladders, siphons or reservoirs can help mitigate changes in temperature or flow rates.

Policy adaptation strategies can include incentives to encourage positive individual behavior, innovation and elimination of disturbances on salmon and freshwater habitats.

The report emphasized that salmon survival, reproduction and conservation are fundamentally linked to water temperatures and more extreme fluctuations in freshwater environments. Low water flows in the late summer can block access to spawning grounds, and winter flooding can wash eggs out of the gravel. Climate change is impacting the salmon's food supply and the abundance of their predators.

A valuable response by the provincial government could be to use the Water Act to specify that water licenses for the conservation of fish would be given value equal to those for other uses. Revisions to the Water Act for fish conservation purposes should extend to control the location and quantity of groundwater extraction.

In releasing the report at an October 1st event at the Vancouver Aquarium, PFRCC Chair Paul LeBlond explained:

> *"Wild salmon are a valuable gift from the sea, and we need to re-balance our approach in British Columbia to ensure the future of Pacific salmon in light of new risks related to climate change."*

2.5 CASE STUDIES ON CLIMATE CHANGE AND FRESHWATER HABITATS

The ESSA Technologies Ltd background paper mentioned above was accompanied by a valuable document entitled *Helping Pacific Salmon Survive the Impact of Climate Change on Freshwater Habitats: Case Studies*. In it, the authors explained the range and diversity of climate change impacts on salmon in different areas of British Columbia.

The case studies presented the local context of geography, people and salmon at six locations across the province: three interior basins (Okanagan, Quesnel and Nicola Rivers) and three coastal areas (Cowachin, Nass and Englishmen Rivers).

The authors presented their findings in response to four key questions: What is happening? Why is it happening? Why is it significant? What can we do about it?

While the case studies were meant primarily to present technical information and concepts, they present a compelling story about the need for the array of measures necessary to cope with new stream and habitat conditions induced by climate change. These could take the form of various activities: water storage systems; riparian ecosystem restoration; cold water releases; water demand management; slope stability restoration; forest harvesting practices; or, nutrient enrichment.

For the six case study locations, there was no single or simple appropriate response that would be sufficient to solve the overall problem. It is necessary to tailor solutions in a combination of responses to the specific circumstances present in each river basin.

2.6 FALL 2007 COMMUNITY MEETINGS

In mid-October, Council members met in three northern Interior communities to obtain perspectives on local salmon issues. The Upper Fraser meetings in Prince George, Quesnel and Williams Lake drew large numbers of residents from diverse backgrounds and interests in each instance, including streamkeepers, municipal officials, business owners and community activists.

The meetings maintained the same structure and procedures as the Skeena watershed community meetings earlier in the year, encouraging a wide-ranging discussion. While meetings of this type typically dwell on a list of

problems, rather than solutions, the participants were forthcoming with several suggestions of ways to cope with emerging challenges impacting salmon.

The mapping segment of the meetings, led by Council member Mary Sue Atkinson, enabled participants to identify the problems in terms of specific local geographical areas, recording issues and rating their priorities.

The participants expressed views that were different in each community, but some common themes emerged. The high levels of concern associated with the Mountain pine beetle and related insects were notable in each community. Forestry impacts on salmon rivers and streams were noted by several participants. Water quality is being compromised in too many instances. Agricultural and other human impacts are directly undermining fish habitat.

The full summary of discussions in these Upper Fraser meetings is contained in the Appendix section of this annual report.

2.7 HEART OF THE FRASER BACKGROUND PAPER

An extensive study on the Fraser River salmon corridor in the crucial region between Hope and Mission was prepared for the Council and released in November 2007.

The report entitled *Saving the Heart of the Fraser: Addressing Human Impacts to the Aquatic Ecosystem of the Fraser River, Hope to Mission, British Columbia* was prepared by Marvin Rosenau and Mark Angelo. It explained the complex ecosystem of this gravel reach with its array of islands, gravel bars, plants and animal life. It is the stretch of river that includes the largest salmon run in British Columbia—more than ten million pink salmon—as well as serving as the migration corridor for some of the largest spawning runs of sockeye salmon in North America.

The report pointed out the extensive pressures from various development activities. Many habitats have been modified and lost, while others are under imminent threat. It noted that the area's ecosystem is suffering the impacts of land clearing, watercourse draining, forest harvesting, mining, urbanization, dykes, industrial development and agricultural expansion.

In explaining the report, co-author Mark Angelo who is also Deputy Chair of the PFRCC, commented:

> *"Urgent measures must be taken to purchase, manage and protect these sensitive lands. This is one of the most productive stretches of river on Earth, yet many other parts of the province are receiving more attention in terms of coordinated management efforts aimed at ensuring environmental sustainability."*

The Council joined the report authors in making several recommendations, including the establishment of an action plan to stem the losses of these irreplaceable ecosystems. This included the setting-up of a multi-sectoral task force to create a management plan for this stretch of the Fraser River and a program to assemble land purchases and contributions.

The report praised recent actions by a number of private individuals, institutions and environmental non-governmental organizations that together have created a coalition with the objective of saving the Heart of the Fraser. It explained that all four levels of government must become more involved in the acquisition, or similar protection through other means, of key lands from within the Heart of the Fraser.

The Council also specifically called for more diligent enforcement of existing laws and regulations, notably the Fisheries Act, to protect the ecosystems and environmental attributes of this section of the Fraser River.

2.8 BC MINISTERIAL MEETING

The Council's Chair, Deputy Chair and Managing Director met in December 2007 with the Honourable Barry Penner, BC Minister of the Environment, to discuss conservation issues and fisheries protection within the province's jurisdiction.

A focal point of the discussion was the Heart of the Fraser report, particularly the recommendation to establish a task force to build consensus and establish a realistic and effective action plan to protect fish and environmental values in that crucial segment of the river.

Minister Penner was supportive of the notion of a task force, and suggested that it was a course of action that he would suggest to his Cabinet colleagues. Council members provided further information on how the action plan and procedures to encourage land contributions through the Nature Trust could take place.

2.9 REPORT ON HABITAT THREATS

During 2007, the Council members asked retired biologist, Otto Langer, to provide some background information based on his extensive knowledge, scanning what is currently known about the sources and forms of impacts on fish and fish habitat.

In response, he produced the brief report entitled *Report on Habitat Threats: Major Impacts on British Columbia Fish and Fish Habitat and Human Activities That Cause Those Impacts*. That report is reproduced in full in the Appendix section of this annual report.

His report explained the types of changes in streams, watersheds and riparian areas brought on by human impacts. It went on to outline and describe the causal factors and sources of the changes, primarily in terms of industrial and engineering projects that have often had harmful environmental and fisheries consequences.

He concluded that net loss in habitat is occurring, and resources to reverse the trends are not sufficient. He made several broad recommendations related to fisheries and environmental management, including the adoption of assumptions of climate change impacts into salmon management.

3. CONSERVATION CHALLENGES

Some of the most immediate strategic issues for wild Pacific salmon are outlined below in two sections of this report.

The first commentary involves brief descriptions of the Council's perspective on four significant challenges, such as the Wild Salmon Policy implementation, that have been addressed by the Council on previous occasions, but merit an update and reiteration. The second is a comment on salmon hatcheries and enhancement, and the Council's views on this subject that continues to defy consensus or resolution.

3.1 CURRENT STRATEGIC ISSUES

The PFRCC has been intimately involved in the development of the Wild Salmon Policy since the earliest days of its formulation. At the current point more than half-way through its five-year implementation plan, the Wild Salmon Policy appears to be behind schedule to the extent that much of the Policy's strategies are still under development and are not yet at the stage of day-to-day implementation. The Council has volunteered to assist in whatever way it can to help speed up the pace in the Wild Salmon Policy's implementation. This includes active involvement in the public and stakeholder consultations and discussions to encourage adaptation and adoption of key elements of the policy. It also includes the offer by the PFRCC to help establish appropriate evaluation criteria for the required review of progress of the implementation process—a task for which the PFRCC is uniquely qualified.

Another on-going issue for the Council has been a concern about building (or in some cases restoring) the predictive capacity of fisheries management to anticipate and act on a reliable basis. The traditional methods of predicting salmon migrations, run sizes, timing and other key factors have proven to be undependable in too many instances. While salmon are notoriously unpredictable, there seem to have been key changes in the limiting factors, such as ocean productivity. The adoption of new techniques and modeling has not succeeded in restoring accuracy in pre-season forecasts of salmon returns. The Council's great concern about the reductions in salmon assessment in recent years was largely based on anxiety about the validity of the new modeling techniques that were to have made those sources of information less relevant or necessary. In current circumstances, the Council is encouraging the application of more resources into the testing of innovative models that hold the promise of introducing greater predictive capacity for salmon management. Given the uncertainties, an option would be for more resources to be put into the collection of real-time return numbers so as to conserve the resource. In so doing, it would be timely to examine the type of "test fisheries" currently undertaken as well as new options so that weak stocks are not put at risk.

A third issue of concern is the new Fisheries Act that could be instrumental in putting greater precision and practicality into the legislation that is crucial for the future of Pacific salmon conservation. The Council presented its preliminary views on legislative amendments that were then withdrawn in 2007 but are expected to be replaced by a new Fisheries Act in 2008. The PFRCC will be involved in the evaluation of the new legislation from the perspective of salmon conservation, and will offer suggestions to strengthen its provisions that would impact salmon sustainability.

The fourth strategic issue is the need for the Government of British Columbia to proceed soon with an updating of the Water Act to establish a basis for adequate water quality in salmon streams. The current legislation is overdue for revisions. The new legislation will have to address the expectation that water will become an increasingly valuable and shared commodity for a multiplicity of users, including salmon.

3.2 HATCHERIES AND ENHANCEMENT

More than four years ago, the PFRCC decided to investigate the potential impacts of salmon enhancement activities and hatchery operations on wild salmon. A controversy had been brewing for many years about the risks to wild salmon from hatchery production that was meant to supplement naturally-spawning stocks.

The Council was warned that there were vigorously held opposing views on many aspects of the debate about hatcheries and enhancement, and that a project of this sort would be difficult. In retrospect, those warnings were well placed.

Over the past four years, the Council found that there is little documentary research based in British Columbia on which broad conclusions can be drawn about the extent to which wild salmon in this province are put at risk by hatcheries. An initial consultant's report for the PFRCC in 2004 entitled *Making Sense of the Debate About Hatchery Impacts: Interactions Between Enhanced and Wild Salmon on Canada's Pacific Coast* set out the array of perspectives and positions in an overview of the relevant information sources and arguments.

A series of community and stakeholder meetings was sponsored by the Council to obtain further information and comment on the consultant's report. The views expressed in those meetings were summarized in a May 2005 report entitled *Perspectives on Salmon Enhancement and Hatcheries: What the Council Heard*. It set out a compendium of views expressed by stakeholders, interest groups, scientists and citizens who participated in the community meetings and bilateral discussions.

Those two publications laid out the essential information about the prevailing issues and the points of contention, and should be referenced by anyone wishing to ponder the different substantive points, perceptions and positions.

When the Council subsequently set to work trying to draw conclusions and craft advice to ministers responsible for fisheries, the task became especially daunting. Available information and data have not been sufficient to convince those on one or the other side of the hatchery debate. This has stymied the effort to establish a reliable, widely agreed understanding of the interaction and commonalities between wild and hatchery-produced salmon. The absence of conclusive evidence is a strong reason to urge greater collaboration by hatchery personnel with the Science Branch of Fisheries and Oceans Canada towards experimental evaluations of key issues, as discussed below.

Rather than try to reconcile the strongly divergent viewpoints of participants in the hatchery controversies, the Council decided to put forward a few suggestions for guidelines and options. The Council is not, at this time, suggesting any dramatic changes in the management or conduct of hatcheries. Instead, Council members believe that some research and management oversight innovations should be considered by the stakeholders and government officials in their decisions related to salmon hatcheries and enhancement.

- The confidence of the scientific community and environmental organizations in salmon hatcheries could be improved. The Wild Salmon Policy's implementation calls for more inclusive involvement in what is described as an "…open and inclusive process aimed at making decisions about salmon stewardship that consider social, economic and biological consequences." The precautionary approach and emphasis on the priority for wild salmon are crucial aspects of the Wild Salmon Policy as it should apply to hatcheries and enhancement.
- Production hatcheries were established to serve the purpose of permitting fishing opportunities and replacing salmon in areas where wild stocks have been depleted or eliminated. While these goals are admirable, the Council is emphasizing that hatchery operations must adhere to high levels of precaution and

respond to new knowledge as it emerges from research. Continuing hatchery operations should be closely monitored and the impact of hatchery releases assessed within the context of ecosystem interactions.

- Scientific research related to hatchery fish should be specifically directed towards measuring any consequences for genetic fitness as a consequence of breeding with wild salmon. Given that the hatcheries in British Columbia for the most part utilize local wild stocks as compared to the operation of US based hatcheries, this work needs to be conducted with reference to this province's unique situation. Research to date that has been conducted elsewhere has not generated findings that have conclusively informed the public discussion about strengthening or undermining the genetic fitness of wild salmon in British Columbia. The consequences of the genetic impacts require more direct investigation. The mass-marking program of Strait of Georgia hatchery-raised coho may enable the detection of proportions of hatchery fish spawning together with wild coho on natural spawning grounds. This Strait of Georgia program could provide a basis for a productive and informative research project to address the genetic fitness questions.
- The second area for needed research attention is to address the question of whether or not hatchery fish migrating to sea compete with and replace young wild fish. The public demands hatchery releases for the sake of an expectation of catch, whereas hatchery managers in the Strait of Georgia want to resolve questions about competitive interactions between hatchery and wild coho. Competition for food at various life stages beyond the hatchery is not a topic that has received sufficient attention and funding. While many believe that harmful competition occurs others argue that wild fish populations are depleted for other reasons. The Council recommends that Salmonid Enhancement Program hatcheries incorporate experimentation in order to achieve adaptive management in an ecosystem context. The goals of the Wild Salmon Policy will be best served if these hatcheries assist by means of experimental approaches to improve our understanding of marine survival issues.
- As scientific research can always benefit from collaboration, there seems to be an opportunity for more integrated experimentation by staff in different branches of Fisheries and Oceans Canada. A coordinated effort and combined expertise of staff in the Salmonid Enhancement Program and DFO Science Branch could be especially valuable to advance the understanding of marine survival patterns for hatchery and wild salmon.

The public perception of salmon hatcheries is overwhelmingly positive. They are perceived to be a valuable human intervention to reinforce salmon stocks that have been undermined in so many ways by negative human interventions, however inadvertent those may have been. The ingenuity and technology to breed, raise and release salmon has evolved and led to various improvements in hatchery management over the years.

This situation, however, should not be considered carte blanche for the tolerance of any tangible risk to wild salmon as a result of producing hatchery fish. The enthusiasm of hatchery volunteers and salmon enhancement personnel should be encouraged, but not give any cause to overlook the need for increasing diligence in hatchery practices. The application of the precautionary principle is particularly important in light of the long-term implications for wild salmon.

The operation of salmon hatcheries and enhancement programs must adhere to the spirit and substance of the Wild Salmon Policy that is now being implemented. This will involve new approaches to consider the interaction of wild and hatchery salmon within the Wild Salmon Policy's biological risk assessment framework.

4. EMERGING ISSUES AND AGENDA

In setting its agenda for the new year, the Council will be undertaking fewer projects overall in 2008 in order to concentrate resources where they can be most effective.

A continuation of the popular community meetings is planned, starting with the Lower Mainland and Sunshine Coast.

A public information campaign about the Mountain pine beetle, climate change and their associated issues for salmon is being pursued by the Council in 2008, using a similar combination of advertising, brochure distribution and news media profiling as the 2006 campaign on salmon impacts from climate change.

In the Council's planning for activities and projects in 2008, the primary issues and challenges to be addressed in reports or to serve as topics in events were identified in three categories:

4.1 ECOSYSTEM MANAGEMENT PERSPECTIVE

Fisheries management must look for new paradigms to guide its development. The existing predictive tools and regulatory systems have too often failed to cope with salmon stock collapses and crises. In 2008, the Council will continue to contribute to the development of ecosystem approaches to strengthen wild salmon management regimes. The previous Council work in this field related to climate change and water quality has provided a basis for further studies and projects to apply ecosystem approaches.

While various research projects are underway related to aspects of the Strait of Georgia ecosystem, attention is needed to a more careful modeling of the ecosystem in terms of the fisheries. The Council is investigating ways in which it can help foster a coordinated effort through joint projects by conservation, academic and government stakeholders to understand the ecosystem interaction of factors in the Strait of Georgia. The Council believes these efforts must include not only scientists but also fisheries managers, with some of the work being undertaken in an adaptive management fashion. This would involve testing alternative fisheries management strategies and monitoring the results with a focus on determining whether or not highly valued fish, such as salmon, benefit from the changed approach.

Another anticipated Council project in 2008 will build on previous initiatives in climate change, this time with a focus on salmon adaptation strategies and intervention techniques.

4.2 WATER AVAILABILITY AND USE

Competing demands for water have been a significant source of problems for salmon in the Pacific states south of British Columbia. The rationing criteria for water in terms of its quality and quantity for salmon and other fish may soon become a matter to be faced in this province as it has in other jurisdictions. This is particularly important when it is recognized that climate change is making conditions in British Columbia more similar in many respects to Oregon and Washington State where salmon access to water and flows has become a battleground issue.

The Council will proceed to define the terms of reference for a project in 2008 looking at water management in terms of determining the current state of play in matters such as licensing regimes, availability estimates and rights. Initial views suggest that British Columbia has lagged far behind other jurisdictions in valuing the ecological benefits of water. With the anticipated development of significant changes to the province's water strategy and Water Act, this project could lead to a timely contribution of ideas and information.

4.3 PUBLIC AWARENESS AND FISHERIES UNDERSTANDING

In the community meetings of the Council over the past three years, it was suggested that a useful activity would be to single-out some immediate threats to wild Pacific salmon and focus on mitigating them in sequence.

Among the threats to salmon are invasive plants and fish introduced by humans sometimes inadvertently or in other instances intentionally. While invasive plants may not immediately put salmon at risk, some could dramatically change the ecosystem of spawning areas and migration routes, attracting new predators or undermining spawning and rearing habitat. At the same time invasive fish, such as carp, have been known to become dominant in a short time, driving out other species.

The Council will look into developing a public information brochure on invasive species, similar to the 2006 information piece on climate change, to help focus public awareness about the need to prevent the introduction and growth of invasive plants and fish.

A second Council initiative in public awareness is a concentrated effort to use techniques to apply traditional and local ecological knowledge to fisheries conservation. A project will focus on tangible ways to make use of knowledge from these sources and integrate it in ways that are more than merely lip-service to the effort.

5. HOW THE COUNCIL WORKS

The Pacific Fisheries Resource Conservation Council plays a unique role in wild salmon protection and sustainability.

The Council serves as a reliable information source for the public and for government officials seeking to understand the issues concerning Pacific salmon. It commissions expert studies in some cases to fill knowledge gaps and help inform government decisions. It produces reports and advisories meant to provide practical ways to deal with the many challenges in salmon conservation.

The Council provides recommendations, but is not an environmental advocacy organization nor does it operate in the same ways as groups that use lobbying and news media campaigns to influence governments. Those organizations take a considerably different view than the PFRCC in their studies and relationship with the public and government officials. Their strategies for promoting their positions tend in many cases to be confrontational, in sharp contrast to the intentionally cooperative approach that is the Council's modus operandi.

In its work on issues such as hatcheries and aquaculture, the Council has demonstrated its role as the conciliator of the interests of advocacy organizations, interest groups and industry. Unlike some others involved in fisheries issues, the Council has focused its inquiries and reports on identifying the underlying causes, rather than assigning blame for problems. For example, the Council's pivotal role that led to conservation measures to protect pink salmon in the Broughton Archipelago illustrated the ways in which decisive conservation action can be triggered through a cooperative and constructive advisory initiative.

The Council chooses its projects and activities on the basis of their contribution to strategic and long-term interests of wild Pacific salmon. Its projects are selected carefully to ensure that they do not duplicate work being done elsewhere by government or academic personnel. This avoidance of overlap with others involved in salmon conservation is accomplished by having external participants help in developing the Council workplan, including government officials and researchers in fisheries biology, water issues and fish habitat. A competitive selection process is typically used to obtain the most knowledgeable and cost-effective consultants to prepare the Council's background papers. As a result, the Council's projects have had a high degree of acceptance and usefulness, while avoiding replication of work being done by others.

The PFRCC is a ministerial committee comprising a balance of interests and expertise in fisheries conservation, and works to present practical options and advice.

The Council has always reported to both the British Columbia Minister of Fisheries and the federal Minister of Fisheries and Oceans. This unique arrangement for accountability to ministers of both governments reflects their shared fisheries jurisdiction and responsibility. The Council has always addressed its report to the ministers of both governments, and has maintained rapport with ministers and officials at both levels. These contacts have included meetings, briefings, exchanges of correspondence and informal discussions.

While some of the Council's reports deal with issues primarily related to one government, they have consistently been made available to both governments, identifying the recommendations specifically relevant to each of them. The increasing public receptiveness to the Council's reports has been evident in the extensive news media coverage, public requests for copies of reports and website visits by members of the public. The number of media interviews and citations of Council reports in news reports reflects the credibility and quality of the PFRCC's output.

Because the Council's funding has come primarily from Fisheries and Oceans Canada, the financial accountability has been to that government. At the same time, the Council has regularly sought the views of government officials of both levels to help determine the issues that should be addressed in projects and activities sponsored by the Council.

In 2007, for example, Council members requested and received briefings from federal and provincial government officials dealing with various topics. In terms of sheer volume of contacts with government officials during the year, there was as much interaction with officials of the British Columbia government as with Fisheries and Oceans Canada.

The PFRCC has been, since its beginning, a federal-provincial ministerial advisory organization. The mandate assigned in 1998 was clear:

> *"The PFRCC is an independent body that will provide strategic advice to Ministers and the public on the long-term sustainable use of Pacific salmon stocks and their freshwater and ocean habitat in British Columbia."*

The PFRCC has been fulfilling the intent of the July 1997 comprehensive agreement between Canada and British Columbia to have a joint fisheries resource conservation council.

A Council member, Frank Brown, was appointed by the BC Minister of Fisheries in 2001 and provided a valuable contribution in his two years of service. He reported directly as the Minister's representative rather than through a provincial government department.

The Council has had a valuable balance through its members with different backgrounds and perspectives. However, two Council member positions remained unfilled at the end of 2007. One has been vacant since the death of Murray Chatwin in November 2006, and the other since the resignation of Merrill Fearon in April 2007. At the same time, the wind-up of the Aboriginal Fisheries Commission has meant that the ex-officio position to represent aboriginal perspectives has been effectively vacant, although no official notification has been given to the Council. This situation of membership vacancies has caused an increased workload for the remaining members.

The Council has been advised that the membership vacancies will remain until the discussions between Fisheries and Oceans Canada and BC government officials have been completed concerning the possible establishment of a new advisory organization that might replace the Council.

It is the Ministers' prerogative to establish an advisory mechanism which will best serve their mandates. Council members recall, however, that a primary impetus to establish the Council was the loss of public confidence in the credibility of fisheries officials, highlighted in the 1994 Fraser River Sockeye Public Review. The need was identified then for an arms-length organization to provide strategic advice, reporting to ministers rather than to the fisheries departments and their officials. PFRCC members believe that there is still a need for such an arms-length organization to provide strategic advice directly to ministers without going through the filter of the government administrative structure.

Whatever new advisory organization might be considered, it should primarily serve ministers and be accountable at the ministerial level. It should be a source of independent and credible advice and options. And, it should focus on the conservation and sustainability of salmon, rather than be diverted from its focus by having to deal with social and economic issues that would compromise the future of the salmon resource.

Finally, there can be no doubt that wild Pacific salmon continue to need protection in high places, and that an official body devoted to their conservation can help in ensuring their survival and a future sustainable fishery. Given the currently recognized necessity and broadly advocated adoption of an ecosystem approach to fisheries management, a potential change to the PFRCC's mandate, or the adoption of terms of reference by a new advisory group, could widen the scope of the Council beyond strictly dealing with salmon. The advice provided to ministers might be even more relevant if it included wider consideration of the other Pacific fish species and ecosystem interactions.

6. APPENDICES

6.1 Council Members and Staff

6.2 PFRCC Publications

6.3 Report on Habitat Threats: Major Impacts on British Columbia Fish and Fish Habitat and Human Activities That Cause Those Impacts (attachment)

6.4 What's Happening to Wild Salmon in Your Community? What the Council Heard: North Coast Public Meetings March 6–8, 2007 (attachment)

6.5 What's Happening to Wild Salmon in Your Community? What the Council Heard: Mid and Upper Fraser Public Meetings October 16–18, 2007 (attachment)

6.1 Council Members and Staff

Dr. Paul LeBlond serves as the Chairman of the Council and is Professor Emeritus of Oceanography and Physics at the University of British Columbia. Located on Galiano Island, he has a particular interest in climate change. He chairs and serves on several prestigious science panels and advisory boards.

Mark Angelo serves as the Deputy Chair of the Council. He is Program Head and Instructor in the Fish, Wildlife and Recreational Department of the BC Institute of Technology. He is known across North America for his work as a river conservationist, habitat expert, and educator, and was awarded Canada's first National River Conservation Award.

Mary-Sue Atkinson has become a volunteer and advocate for fisheries conservation. She has served as a streamkeeper, and she has led public awareness campaigns and school programs to expand public awareness about watershed protection and survival of wild salmon.

Merrill Fearon (Council member to April 2007) is a former Executive Director of the Federation of BC Writers and has been involved in innovative educational programs and resources, including the Sturgeon General website to educate children about the Fraser River. She has worked with community stewardship groups to improve their information programs, and has been a director of the Save Our Fish Foundation.

The Honourable John A. Fraser served as Chairman of the Council from inception until April 2005, and now continues to serve as a Council member. He is a former Minister for the Environment and Minister of Fisheries, and served as the first elected Speaker of the House of Commons. He headed the Fraser River Sockeye Public Review Board investigating the salmon fishery and was also Canada's Ambassador for the Environment.

Dr. Jeff Marliave is Vice President of Marine Science at the Vancouver Aquarium. He is an extensively published scientist involved in hands-on research as a diver. He has been instrumental in providing leadership for the Council to deal effectively with several high-profile issues including salmon aquaculture and protection of pink salmon stocks.

Marilyn Murphy is the Executive Director of the Sport Fishing Institute of BC. She has spent her career involved in sportfishing as a fishing guide and lodge manager, contributing to the sustainable use of salmon resources. She is also currently the Chair of the BC Southern Sportfishing Advisory Board. She became a PFRCC member in December 2003.

Marcel Shepert is involved in the aboriginal fishery, having been executive director of the Fraser Watershed Fisheries Secretariat and also a fisheries program manager and coordinator for the Carrier Sekani Tribal Council. Located in Prince George, he has been a leader and representative of First Nations' interests in resource management, negotiations and conflict resolution.

Dr. Richard Beamish is an ex-officio member representing Fisheries & Oceans Canada.

Arnie Narcisse is an ex-officio member representing the BC Aboriginal Fisheries Commission, an organization he also chairs.

Gordon Ennis—The Council's Managing Director

Priscilla Singh—The Council's Administrator

6.2 PFRCC Publications

Annual Report 1998–1999 (Released June 1999) This report and its four accompanying background papers were the first products of the Pacific Fisheries Resource Conservation Council. Together they were intended to present a package of information and advice to governments and the Canadian public on the conservation of Pacific fish populations and habitat in British Columbia.

Freshwater Habitat (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, June 1999) Salmon and steelhead habitats in British Columbia are almost as varied as the province's geography. The rich biological diversity of species and stocks of salmonids—the family to which salmon and steelhead belong—is an evolutionary response to the physical and chemical variability of the habitats in which these fish live.

Salmon Stocks (Background paper by Dr. Carl Walters and Josh Korman, June 1999) Providing a broad species-by-species overview of stock status and trends for BC as a whole, this paper presents an overview of the fisheries management issues associated with determining stock status. The aim is not to provide a detailed or complete enumeration of all local conservation issues, but rather to highlight major concerns, and to identify needs for more detailed analysis.

Fraser River Sockeye (Background paper authored by Dr. Richard Routledge and Ken Wilson, June 1999) This paper details historical trends regarding Fraser River sockeye runs. It also addresses management concerns and concludes with recommendations.

Coast-Wide Coho (Background paper authored by Dr. Richard Routledge and Ken Wilson, June 1999) Canada's management and protection of freshwater coho habitat leaves much to be desired. The effect of loss and degradation of freshwater coho habitat in the decline of southern BC coho is complex. There are very few pristine watersheds in southern BC. Loss and degradation of freshwater coho habitat is very widespread. Most biologists agree that we have lost productive coho habitat, and that habitat loss represents a significant long-term threat to wild coho production.

Climate Change and Salmon Stocks (October 1999 conference summary) This one-day workshop hosted by the PFRCC focused on the questions, "What is the most alarming potential impact of climate change on salmon stocks?" and "What is the best strategy to adopt?"

Annual Report 1999–2000 (Released May 2000) This annual report of the Council reviews the state of salmon stocks and related habitat conditions, and includes particular attention to a set of areas, salmon populations and habitat situations that are at-risk. It looks at four issues in particular—climate change, the *Pacific Salmon Treaty,* salmon in the Central Coast, and strategic management.

Water Use Planning: A Tool to Restore Salmon and Steelhead Habitat in British Columbia Streams (Background paper by Dr. Marvin Rosenau and Mark Angelo, May 2000) Currently, many western North American heritage plants and animals are being lost due to careless use of water and this cannot be rectified until they attain preferred status for access to this important life-giving resource. Salmon and steelhead populations are among the species impacted by excessive human use of water.

Review of the Coho and Chinook Salmon Sections of the "Agreement Under the Pacific Salmon Treaty" between Canada and the United States, dated 30 June 1999 (Background paper by Randall Peterman and Brian Pyper, May 2000) This report reviews the "Agreement under the Pacific Salmon Treaty" between Canada and the United States. The terms of reference given to the authors by the PFRCC focused this review on how adequately the Aggregate Abundance-Based Management rules specified in the Agreement would deal with conservation issues for Canadian coho and chinook salmon.

Sand and Gravel Management and Fish-Habitat Protection in British Columbia Salmon and Steelhead Streams (Background paper by Dr. Marvin Rosenau and Mark Angelo, May 2000) Sand, gravel and other sediments within and adjacent to spawning and rearing streambeds are fundamental to the productivity of salmon and steelhead stocks. The high levels of production formerly seen in many of British Columbia's chum, pink and sockeye populations were, in part, the result of the conditions of the spawning sediments, primarily gravel, available for these fish. For instance, the quality of the freshwater rearing environment for coho, chinook and steelhead is more crucial than the amount of spawning area.

State of Salmon Conservation in the Central Coast Area (Background paper by Allen Wood, May 2000) Areas 6 to 10 of British Columbia's Central Coast were selected for study because this region provides a good measure of the current state of domestic stocks and their management. This is one of the few relatively undeveloped areas left on the coast.

The Wild Salmon Policy and the Future of the Salmonid Enhancement Program (Council Advisory, June 2000) The March 2000 *Wild Salmon Policy Discussion Paper* was part of a series of Fisheries and Oceans Canada projects flowing from the New Directions policy initiative which was begun in October 1998. The New Directions initiative was being developed in tandem with the Pacific Fisheries Adjustment and Restructuring Program. Fisheries and Oceans engaged in a round of public consultations with respect to its proposed Wild Salmon Policy, as well as the future of the Salmonid Enhancement Program, and the PFRCC provides its views in this Advisory.

Salmon Conservation in the Central Coast (Council Advisory and background paper prepared for the Council by Allen Wood, March 2001) The conservation status of chinook and coho salmon populations in the Central Coast has become a matter of growing concern. Poor returns of salmon and other important fish species have undermined the commercial and aboriginal fisheries and affected communities throughout the region. The PFRCC's sponsorship of this background paper was intended to provide a factual and analytical basis for the Council members to provide comments and recommendations, and to present technical information that can enable the public to understand the situation.

A Crisis in Fisheries Education (Council Advisory, September 2001) Effective management of fisheries on sound conservation principles is essential if we are to maintain both biodiversity and healthy salmon stocks in British Columbia. The human resources in the fisheries sector and the skills they apply are increasingly crucial to the success of activities intended to safeguard and enhance the prospects for wild salmon.

The Role of Public Groups in Protecting and Restoring Freshwater Habitats in British Columbia, with a Special Emphasis on Urban Streams (Background paper by Dr. Marvin Rosenau and Mark Angelo, September 2001) There has been an upsurge of community and public involvement in the protection and rehabilitation of British Columbia rivers and streams, and an evolution towards a more collective engagement in the management of these resources. This has begun to result in some remarkable successes.

Annual Report 2000–2001 (Released December 2001) This report provides a preliminary summary of the state of stocks in 2001. It is preliminary because final spawner counts will not be available for a number of months. The report also summarizes research findings and thinking to date on the subject. Lastly, some related issues are discussed, and some important conservation and management questions are put forward.

Annual Report 2001–2002 (Released October 2002) This report is innovative in assembling information that is not otherwise available to the public in any other publication. It considers Pacific salmon in four regions of southern BC: Fraser River basin; Okanagan; Strait of Georgia; and West Coast of Vancouver Island. For each region and species, the report summarizes trends in spawning population sizes since the early 1950s, explains the annual monitoring of these populations, and identifies conservation concerns.

The Protection of Broughton Archipelago Pink Salmon Stocks (Council Advisory, November 2002) The European experience indicates that sea lice abundance can be associated with salmon farming. This advisory makes recommendations on how to safeguard the wild pink salmon runs of the Broughton Archipelago.

Making Sense of the Salmon Aquaculture Debate: Analysis of Issues Related to Netcage Salmon Farming and Wild Salmon in British Columbia (Report commissioned by the PFRCC, prepared by Julia Gardner, Ph.D., and David L. Peterson, January 2003) This report takes a look behind the debate, examines the information and assumptions supporting the arguments of opposing interests, and deepens the current public understanding about the potential impacts of salmon aquaculture on wild salmon. The report's focus was on the interplay of salmon farming and wild salmon, not on all aspects of the potential impacts of salmon farming. Instead, the report concentrates on the most pressing issues pertaining to farmed salmon/wild salmon interactions.

Wild Salmon and Aquaculture in British Columbia (Council Advisory, January 2003) This Advisory provides information and recommendations for action on the potential and perceived impacts of salmon netcage aquaculture on wild salmon and their habitat in British Columbia.

The Salmon Aquaculture Forum: Discussion Paper on Practices & Findings (Authored by the Honourable John A. Fraser and Kenneth Beeson, December 2003) The authors report on their extensive stakeholder discussions and public policy research on best practices across North America and Britain to produce this paper on resolving salmon aquaculture controversies and establishing consensus on the future of fish farming. It cites the importance of First Nations involvement and constructive public participation. It suggests a broader framework and initiatives for government advisory systems to work more productively.

The Salmon Aquaculture Forum: Briefing Note to Ministers (Authored by the Honourable John A. Fraser and Kenneth Beeson, December 2003) This report sets out the principles and criteria for the new Forum, and proposes the key elements that will be necessary to make it acceptable to all participants and effective in fostering public dialogue and understanding of the issues. It offers some alternatives in terms of the scope and scale of the Forum's activity.

Annual Report 2002–2003 (Released August 2003) This annual report puts forward the current findings related to stock status and habitat conditions, and it presents a summary of the Council's viewpoint on some of the most significant and immediate matters of concern. In some instances, the comments summarize and clarify the positions explained in previous Council reports. In other cases, such as salmon aquaculture, this report contains the Council's more recent consensus views.

Conflicts Between People and Fish for Water: Two British Columbia Salmon and Steelhead Rearing Streams in Need of Flows (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, September 2003) Using the Nicola and Englishman rivers as examples, this background paper explains how water levels and flows influence the productivity of salmon. It describes the regulatory regimes for water access and how there has been increasing competition for water for urban development, agricultural and industrial uses. It suggests adopting a hydrological budgeting process to allocate water to fish and other uses in a fair and transparent manner, and enforcing the water license system more effectively.

Pacific Salmon Resources in Central and North Coast British Columbia (Authored by Dr. Brian Riddell, February 2004) This report summarizes the status of all salmon stocks in the central and north coast areas of BC and complements Council's 2002 report on the status of south coast salmon stocks. Data on escapements are presented, over time, for all five species of Pacific salmon. Inconsistent and inadequate data have created assessment challenges. While these salmon are threatened by economic development, climate change and human population growth they also remain a diverse, highly dynamic and resilient group of species.

Advisory: Salmon Conservation Challenges in British Columbia with Particular Reference to Central and North Coast (Council Advisory, February 2004) This report summarizes Council's advice based upon an extensive analysis of the status of all salmon stocks in the central and north coast areas of BC. The advisory points out serious shortcomings in DFO's salmon assessment program. Budgets for assessment are decreasing at a time when international protocols, the new Species at Risk Act and an increasingly aware and concerned public demand better information. This Council advisory recommends the development and funding of a core assessment program aimed at the generation of quality information.

Making Sense of the Debate about Hatchery Impacts: Interactions Between Enhanced and Wild Salmon on Canada's Pacific Coast (Report commissioned by the PFRCC and prepared by Julia Gardner, David L. Peterson, Allen Wood and Vicki Maloney, March 2004) This report sets out the various positions that have been expressed by scientists and others, with a focus on potential harmful interactions between enhanced and wild salmon. It explores the opinions and arguments surrounding the impacts and explains the various concepts, theories, practices and research in this field. Risks are examined in the context of the tendency to over-harvest un-enhanced stocks where mixed-stock fisheries occur, genetic impacts, ecological impacts, disease and negative impacts on habitat from the enhancement facilities.

Annual Report 2003 (March 2004, released April 2004) This annual report summarizes initial findings from Council's extensive analysis of the status of all salmon stocks in the central and north coast areas of BC. This report also provides a summary analysis of past recommendations to both levels of government and the influence that advice had on government decisions. This advice is summarized in terms of five topics or themes: biodiversity of Pacific salmon, effective management, adequacy of information, risk minimization and the development of a guiding policy framework.

Does Over-Escapement Cause Salmon Stock Collapse? (Technical paper prepared by C. Walters, P. LeBlond and B. Riddell, April 2004) This report looked at all available information from British Columbia on whether large spawning populations that exceeded "normal", target or historical numbers, were followed by stock collapses. There was evidence that there was a levelling-off of salmon production for runs having a high escapement, but there was no evidence of over-escapement causing stock collapse.

Reality Stewardship: Survival of the Fittest for Community Salmon Groups (Report commissioned by the PFRCC and the Vancouver Foundation, prepared by Brian Harvey and David Greer, July 2004) Given funding cuts from government, this report recommends strategies for survival including a focus on activities that will appeal to private donors and foundations. Projects are suggested that will allow volunteers and professionals to work together rather than compete for limited funds, and require the science-based planning approach that has sometimes been missing from ad-hoc community stewardship. Among their recommendations, the authors propose forming consortia with fund-raising and management skills and local political support.

The Evolution of Commercial Salmon Fisheries in British Columbia (Report commissioned by the PFRCC, prepared by Stuart Nelson and Bruce Turris, December 2004) This paper traces the trends in fisheries management from the 1960s to the present period. The report does much to inform the public on how the fishery has evolved from a large industrial scale to the current smaller more controlled scale designed to improve salmon conservation. The commercial salmon fishery has undergone significant changes to improve conservation of the salmon resource. The report argues that the high conservation bar set to protect wild salmon and economically viable commercial fisheries are not mutually exclusive.

Annual Report 2004 (April 2005) This annual report presented a summary of the publications and primary recommendations of the PFRCC in the preceding year. It also provided an account of the activities in support of salmon protection and habitat restoration, and the perspectives of Council members on matters including the capacity of regulatory and management agencies to conserve Pacific salmon.

Perspectives on Salmon Enhancement and Hatcheries: What the Council Heard (May 2005) This Council report summarizes the results of public meetings, one-on-one meetings and written submissions related to the subject of salmon hatcheries. British Columbians believe that salmon hatcheries and enhancement are needed to protect wild stocks. Others are concerned that hatcheries can create negative impacts and that enhancement needs to be done right.

Conflicts Between Agriculture and Salmon in the Eastern Fraser Valley (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, June 2005) This paper was presented to the Council describing issues and challenges related to agricultural impacts in the lower Fraser River from Hope to Sumas and its tributaries. It highlighted the ways in which environmental remediation could occur efficiently, and how aquatic ecosystems and salmon protection can be enhanced without undermining agricultural viability.

Selection and Use of Indicators to Measure the Habitat Status of Wild Pacific Salmon (February 2006) This report was produced in support of "Canada's Policy for the Conservation of Wild Pacific Salmon" which amongst other things makes a commitment to monitor the status of salmon habitat. The report represents a synthesis of the literature plus the results of an expert workshop on indicators of habitat status. It recommends indicators related to water quantity and quality, physical habitat, aquatic and riparian ecosystems, estuarine ecosystems, ecosystem biodiversity and land use conversion. The report also recommends a pilot program to gather information on levels of required effort, expertise, costs and effectiveness.

Managing Pacific Salmon for Ecosystem Values: Ecosystem Indicators and the Wild Salmon Policy (March 2006) This report outlines the role that Pacific salmon play in shaping aquatic and terrestrial ecosystems. It proposes indicators that might be used to measure this ecosystem role and future work needed to eventually guide policy makers on how to incorporate ecosystem values in their management considerations. This report addresses the issues in Strategy 3 of "Canada's Policy for the Conservation of Wild Pacific Salmon".

First Nations, Salmon Fisheries and the Rising Importance of Conservation (April 2006) Cooperation between First Nations, commercial and recreational fishers is vital to ensure that adequate numbers of salmon make their way to the spawning beds, helping to perpetuate future runs. So too is the need to resolve intertribal issues over the allocation of salmon resources. This report outlines positive results of First Nations initiatives to conserve salmon runs. Examples of selective, conservation-focused salmon fisheries abound.

The Evolution of Recreational Salmon Fisheries in British Columbia (June 2006) This report explains how the recreational and sports salmon fishery evolved in British Columbia and how it has undergone significant growth in the last century. The dual challenge of designing conservation measures and ensuring fishing opportunities for anglers is one of the themes of the report. The authors explain that the long-term sustainability of both salmon and the sports fishery are inextricably linked, and effective conservation is an imperative.

Feeling the Heat: Can We Help Salmon Survive (June 2006) This pamphlet report reminds us that to reproduce mature sockeye salmon must survive a "marathon swim that makes Olympic athletes look like couch potatoes." More frequent weather extremes and changing conditions are threatening the survival of Pacific salmon. This report outlines some of the changing climate conditions that salmon must deal with and the research being done to better understand the factors affecting salmon. Salmon are resilient and adaptable but climate change dispels the notion of certainty in fisheries management; stocks are now threatened and they need our help to survive.

Annual Report 2005 (June 2006) This Annual Report reviewed the substantive recommendations made by the Council to DFO regarding the proposed Wild Salmon Policy. Most of recommendations were adopted by DFO during finalization of the Policy but the Annual Report continued to stress the need for adequate funding to implement that Policy. The report also reviewed other work undertaken by the Council including the hosting of a symposium on climate change and Fraser River sockeye salmon; our analysis, at the request of the Minister, of the utility of using acoustic tags to better monitor and protect Cultus sockeye especially during fishing periods; and our review of the impact of agriculture on wild salmon in the eastern Fraser Valley.

Advisory: Implementing the Habitat and Ecosystem Components of DFO's Wild Salmon Policy (October 2006) This advisory describes a framework for the joint implementation of the habitat and ecosystem management components of the Wild Salmon Policy. It recognizes the overlaps between habitat and ecosystem strategies and the cost efficiencies if both programs are carried out together. We recommend different intensities of monitoring with broad scale indicators being used throughout BC's salmon waters and detailed monitoring only taking place where high-valued habitat is under threat. We stress that monitoring and management actions must be linked. To assure DFO access to critical broad-based data sets and to recognize the vital role that the province plays in resource development and inventory, the report suggests a formal agreement on data access and sharing. To assure success, DFO should also work cooperatively with First Nations, industry and local stewards of salmon.

What's Happening to Wild Salmon in Your Community? What the Council Heard: Vancouver Island Public Meetings (October 2006) This report summarizes the results of public meetings held on Vancouver Island in March 2006. During the meetings, the PFRCC shared information on how climate change is impacting Pacific salmon. The greater portion of the meetings, though, was to hear from the participants about how wild salmon were doing in their community. This report summarizes the comments made in plenary sessions, as well as the smaller round-table discussions and the results of mapping exercises where individuals were provided an opportunity to outline areas of greatest concern and opportunity—providing tangible examples of the broader concerns expressed earlier. Key themes heard from all communities' involved stock status, habitat impacts, fisheries, ecosystem management, predation from seals and sea lions, fish farming, positive examples of local stewardship programs, and reduced program funding.

What's Happening to Wild Salmon in Your Community? What the Council Heard: BC Interior Public Meetings (June 2007) This report summarizes the results of public meetings held in the BC Interior in October 2006. During the meetings, the PFRCC shared information on how climate change is impacting Pacific salmon. This report summarizes the comments made in plenary sessions, as well as the smaller round-table discussions and the results of mapping exercises where individuals were provided an opportunity to outline areas of greatest concern and opportunity—providing tangible examples of the broader concerns expressed earlier.

Advisory: An Ecosystem-based Approach to Managing Salmon in Georgia Strait (June 2007) The Council members issued this Advisory proposing an ecosystem-based approach to replace the single-species management in order to deal with the array of crucial environmental factors and interactions of species that would be more appropriate in establishing salmon conservation strategies.

Annual Report 2006 (June 2007) The Council's eighth annual report emphasized the importance of innovation in fisheries management, such as applying research findings into management practices, and encouraging public participation in more productive ways to encourage new perspectives in salmon conservation.

Report on Habitat Threats: Major Impacts on British Columbia Fish and Fish Habitat and Human Activities that Cause Those Impacts (June 2007) This brief background paper was produced by fisheries biologist Otto Langer to provide a perspective for the Council on the types of changes in streams, watersheds and riparian areas, and the causal factors and sources of the changes in relation to salmon.

Helping Pacific Salmon Survive the Impact of Climate Change on Freshwater Habitats (September 2007) In this background paper prepared by Essa Technologies Limited, the authors propose a four-phased approach to enable community leaders and government officials deal with the effects of climate change, particularly in reference to the water flows, temperatures and other factors affecting salmon productivity.

Helping Pacific Salmon Survive the Impact of Climate Change on Freshwater Habitats: Case Studies (September 2007) This case studies document was prepared by Essa Technologies Limited as a supplement to its background paper, explaining examples of climate change and responses in six areas of British Columbia.

Saving the Heart of the Fraser: Addressing the Human Impacts to the Aquatic Ecosystem of the Fraser River, Hope to Mission, British Columbia (November 2007) In this extensive background study, the authors Mark Angelo and Marvin Rosenau describe the complex salmon ecosystem in a crucial stretch of the Fraser River and present several options to deal with the impacts of development, as well as procedures to stem the losses of these valuable and irreplaceable ecosystems.

What's Happening to Wild Salmon in Your Community? What the Council Heard: North Coast Public Meetings (March 2008) This report summarizes the results of public meetings held in the Skeena drainage in March 2007. During the meetings, the PFRCC shared information on how climate change is impacting Pacific salmon. This report summarizes the comments made in plenary sessions, as well as the smaller round-table discussions and the results of mapping exercises where individuals were provided an opportunity to outline areas of greatest concern and opportunity—providing tangible examples of the broader concerns expressed earlier.

What's Happening to Wild Salmon in Your Community? What the Council Heard: Mid and Upper Fraser Public Meetings (July 2008) This report summarizes the results of public meetings held in the mid and upper Fraser in October 2007. During the meetings, the PFRCC shared information on how climate change is impacting Pacific salmon. This report summarizes the comments made in plenary sessions, as well as the smaller round-table discussions and the results of mapping exercises where individuals were provided an opportunity to outline areas of greatest concern and opportunity—providing tangible examples of the broader concerns expressed earlier.

REPORT ON HABITAT THREATS

MAJOR IMPACTS ON BRITISH COLUMBIA FISH AND FISH HABITAT AND HUMAN ACTIVITIES THAT CAUSE THOSE IMPACTS

Prepared for Pacific Fisheries Resource
Conservation Council by
Otto E. Langer, R.P. Bio

JUNE 2007

Report on Habitat Threats: Major Impacts on British Columbia Fish and Fish Habitat and Human Activities that Cause Those Impacts

Otto E. Langer, R.P. Bio

For quotes and short excerpts from the material covered under "fair use", we recommend the following citation: Langer, O. 2007. Report on Habitat Threats: Major Impacts on British Columbia Fish and Fish Habitat and Human Activities that Cause Those Impacts. Vancouver, BC: Pacific Fisheries Resource Conservation Council.

For further information about this document and about the Pacific Fisheries Resource Conservation Council (PFRCC), contact:
Pacific Fisheries Resource Conservation Council
290–858 Beatty Street
Vancouver, BC V6B 1C1
CANADA
Telephone 604 775 5621
Fax 604 775 5622
www.fish.bc.ca
info@fish.bc.ca

TABLE OF CONTENTS

1.0 INTRODUCTION

This paper was commissioned to provide background information for the members of the Pacific Fisheries Resource Conservation Council. The author, Otto Langer, is a biologist, retired after a career in the federal public service with Fisheries and Oceans Canada. He was asked to present the Council with an overview of the significant conditions and trends related to Pacific fisheries habitat.

Settlement of British Columbia by non-aboriginals over the past 150 years has brought great anthropogenic changes to the landscape resulting in significant impacts to fish habitats in our rivers, lakes, estuaries and oceans. At first, changes were local and not significant to watersheds except for dams on streams and placer mining in the Cariboo. However, fish habitat and supporting watersheds began to be more significantly impacted as the human population and its need for natural resources increased. Throughout the 20th century, continual human population growth and exploitation of natural resources resulted in major damage to fish habitat, reduced fish production and the extirpation of certain species in many areas of BC. Damage to habitat has included both alterations to the physical structure of habitat as well as a degradation of water quality. While individual alterations often did not cause significant harm, overall it has been the accumulation of a multitude of alterations that has resulted in sufficient lost or damaged habitat to impair fish populations.

This short review covers fish habitat from two perspectives: Section 2 describes those attributes of fish habitat that are under the greatest threat of alteration while Section 3, outlines major human activities that damage fish habitat. These are presented in order of concern with *** indicating highest present concern. Some general conclusions and recommendations are offered which the author believes would improve the protection and conservation of the aquatic ecosystem and its fish populations for future generations. The impacts of the aboriginal, commercial and sports fishery is not included in this review.

2.0 MAJOR ASPECTS OF FISH HABITAT THREATENED BY HUMAN ACTIVITY IN BRITISH COLUMBIA

2.1 CUMULATIVE WATERSHED CHANGE***

Overall cumulative changes in watersheds alter the processes that are actually responsible for the creation and maintenance of fish habitat. Accordingly one can often gauge the status of fish habitat health by simply measuring human activity in the watershed. For instance when urban development reaches five percent impermeable surface area (ISA) of a watershed, one can measure impact on stream hydrology and fish habitat. At 10% ISA irreversible changes have taken place and at 20% most streams will not support populations of salmon. Likewise, studies in King County, Washington have shown that once eight or more road crossing occur on a kilometer of stream, its biological integrity is jeopardized. Watershed change is subtle and insidious. Presently there is inadequate legislation directing sustainable development in a manner which would prevent the elimination of fish and fish habitat in urban watersheds where human activity is most intense.

2.2 CLIMATE CHANGE AND TEMPERATURE***

Many marine and freshwater fish species such as cod, halibut, and sablefish and salmon, trout and char depend upon cold water conditions for most if not all phases of their life cycles. To date, ocean regime shifts and warming of waters in lakes, rivers and the ocean have had negative impacts on fish survival. Probable global warming related conditions have been most obvious in the ocean environment and in freshwater rivers in southern British Columbia, including the Fraser River. Warm water conditions are believed to have already affected adult salmon fish migration behavior and survival in Fraser River stocks. In some rivers such as the Nicola and Salmon, high summer water temperatures are already lethal to juvenile salmon. Closely related to climate change impacts that will aggravate stream temperature rise is the loss of forest cover due to logging and climate change induced forest disease such as mountain pine beetle. Over the longer term, it is expected that normal rain and snow patterns will be altered, and with resulting glacier loss, the flows and temperatures of streams will change with probable negative impacts on fish and their habitat.

2.3 RIPARIAN VEGETATION LOSS***

Intact riparian vegetation is necessary to maintain the integrity of the shoreline and provide food, cover and shade for fish in lakes, rivers and streams. An intact shoreline also serves to control erosion and sedimentation and acts as a filter to mitigate contaminant entry into the aquatic environment. Once lost to development, riparian habitat is difficult and costly to replace. Maintaining or restoring this vegetation is particularly crucial for streams and rivers with low water flows and will become even more essential to mitigate higher stream temperatures in the face of global warming.

This habitat type is under greater pressure now than in past years because of the current rush to own foreshore property for recreational and other development purposes. In addition to the potential of private owners removing the natural vegetative cover, they often build facilities such as docks and retaining walls that can have a significant negative impact on fish habitat if not designed properly or if developed in large numbers in a restricted habitat area. Effective development setbacks and facility design sensitive to fish habitat needs, as well as development of communal facilities such as a common dock by several property owners could minimize damage.

2.4 LOW AND ALTERED STREAM FLOWS***

A major conflict has always existed between industrial and domestic extraction of water from streams and protection of freshwater fish and their habitat. Hydro dams, from the century old B.C. Hydro dam on Shuswap Falls to modern run of the river dams, have and will continue to modify river flows from the natural high and low flow regimes that fish are adapted to. This can reduce or eliminate fish production. However, of even greater concern is the removal of water from rivers for domestic and irrigation purposes. This is a key issue in some Vancouver Island areas such as Black Creek, the B.C. Interior's Columbia and Fraser River Basins. In the B.C. Interior, hundreds of smaller dams have been constructed to impound irrigation waters and the diversion of those waters occurs at times of the year when the streams naturally have lower flows and maximum summer temperatures. This has greatly impacted salmonids in streams such as Duteau Creek and the Deadman, Salmon and Nicola Rivers. This problem has been greatly aggravated by continual riparian cover loss and will worsen with the increasing role of climate change in raising stream temperatures. The Columbia is an unfortunate example of a major system whose flows have been altered by dams and diversions for all these human purposes, irrevocably damaging once highly productive fish populations.

2.5 STREAM CHANNEL ALTERATION**

Stream channel alteration is an insidious process that is often approved on a piecemeal basis until the cumulative effect results in the loss of habitat complexity, a characteristic of good fish habitat. Roads, dykes, flood control activities and stream bank rip rapping most often result in the channelization and narrowing of a stream and habitat parameters such as a complex bank and side channels with riparian cover are lost. This is most commonly seen in rivers and streams in rural and urban areas where the stream is seen as a nuisance or a threat to property owners. Another area of conflict has been the removal of gravel from rivers such as the Lower Fraser and Chilliwack to supposedly reduce flood threats. The politics and economics of obtaining gravel from the local stream has always been in conflict with the protection of this critical habitat. A healthy fish stream is usually one that has not undergone significant channel or stream bank modification and has had minimal removal of gravel bars.

2.6 SEDIMENTATION**

Almost every terrestrial or aquatic construction project or land development activity results in an enhanced elevation of sediment discharge to the local waterway. Sediment discharge into waterways occurs mostly from landscape erosion but can also originate from point discharges. Cold water fish, especially the salmonids, require clean gravel for the critical life cycle phase of spawning. Indeed most salmonid mortality is caused in the egg to alevin incubation stage by elevated levels of fine sediments clogging up stream, and in some cases such as Cultus and Shuswap Lakes, beach spawning gravels. This results in suffocation of the eggs and alevins due to a lack of oxygen and a buildup of metabolic wastes. River water must percolate through clean river gravels to support fish and invertebrate life. Many sediment dischargers have been taken to court and although many precautions have been implemented over the decades, this is still a real problem at road construction and land development sites, gravel quarries, placer and other mines.

2.7 PREDATION, COMPETITION AND THE INTRODUCTION OF EXOTIC SPECIES**

The constant introduction of alien species into existing habitats all over the world is known to be one of the biggest threats to indigenous fish and their habitat. The introduction of alien species can be accidental (e.g. Spartina cord grass, green crab) or planned (e.g. Atlantic salmon, Pacific oyster, Mysid shrimp). Presently it is the inadvertent introduction that is of greatest concern. This concern relates to the introduction of plants, invertebrates, fish and disease organisms. In addition to the introduction of exotic species is the natural, but increasing, migration of southern warm water species such as tuna and larger numbers of hake into the warming Northwest Pacific fishery waters. The movement of larger hake populations into BC offshore waters has resulted in increases in predation of juvenile salmon and eulachon which may have contributed to low returns of those stocks spawning in BC streams.

2.8 WETLAND LOSS**

The loss of wetlands from our watersheds, estuaries and marine environment was a greater issue prior to the 1980's. Often the drainage of wetlands for urban and agricultural development was deliberately promoted, resulting in the loss of an especially productive habitat type for fish and the aquatic ecosystem, including dependent wildlife. Governments and the public are now more aware of the value of wetlands but in practice, there is no effective legislation to protect wetlands unless fish are directly associated with those wetlands and the Fisheries Act is called into play.

2.9 COASTAL ZONE IMPACTS*

The ocean was once seen as robust, limitless habitat for fish. Unfortunately, as in lakes and rivers, the marine shoreline, inter-tidal zone, and near shore areas are under increasing pressure in many areas by settlements, fish farms, fishing gear, log booming and transportation and many have been needlessly harmed. Key habitat areas are found all along the coastline and efforts to protect them effectively have been slow and generally ineffective. Despite an Oceans Act and several initiatives to protect marine habitats, little progress has been made in enacting an overall coastal zone management scheme which incorporates a network of marine reserves and enhanced protected areas.

2.10 WATER QUALITY CHANGE*

If one ignores temperature change, water quality is one of the few parameters that has generally improved over the past two to three decades despite a great increase in human population in BC. Many highly polluting works such as Skeena, Ocean Falls and other pulp mills have been closed or have installed treatment works. Cities such as those in the Greater Vancouver area have accepted secondary sewage treatment for discharges to the Fraser. Unfortunately, the Lions Gate and Iona sewage plants still discharge primary treated effluent and Victoria's sewage is dumped into the ocean with even less treatment. Pesticide kills have been reduced over the years, however a myriad of spills from ever increasing urban settlement areas and transportation infrastructure continue to be a risk to good water quality.

3.0 INDUSTRIAL SECTORS AND ACTIVITIES THAT CAUSE HARMFUL IMPACTS ON FISH, FISH HABITAT AND WATER QUALITY

3.1 SETTLEMENT AND URBAN DEVELOPMENT***

Logging an area can cause impacts on fish habitat. When that land is converted into grazing land and then cultivated, the negative impacts become intensified. However, it is the final stage of land development, urbanization and industrial development, which has the most catastrophic impact on fish habitat. The impact can be especially great during construction due to sediment impacts and changes to riparian zones and often to the stream channel. However, once the infrastructure is in place the impacts of impermeable surface areas, storm water runoff and contaminants result in the permanent impairment of most fish habitat values. The only way to mitigate such impacts is by implementing setbacks and riparian leave strips that are more generous than seen in BC to date together with a system of storm water retention and detention in neighborhoods before discharge to the stream. Environmental impact studies are needed to effectively design a minimal human settlement footprint in each watershed. Unfortunately, urban development, which has the greatest land use impact on the aquatic environment seems often to be exempted any review of environmental impact.

3.2 FOREST PRACTICES***

Logging has always been a thorn in the side of aquatic habitat protection and in the control of sediments discharges into fish streams. The will to protect fish habitat when developing logging roads and harvesting a watershed has been low but improvements have occurred during the past three decades. However, improvement are still required in terms of limiting the rate of cut, and in the design of logging roads, including the use of more bridges to reduce the impacts of culverts and the storage of logs in sensitive habitat areas. Of special present concern is the impacts of greater areas of forests burned by wild fire or killed by disease and the resulting added impacts of salvage logging.

3.3 MINING AND PETROLEUM DEVELOPMENT**

The impacts related to hard rock, coal and placer mining, gravel quarrying and petroleum exploration and extraction each has its own unique impacts. Over the years gravel and placer mines have largely been forced out of BC rivers where they caused great damage to habitats. Hard rock mines, other than their access roads, often have a localized impact on fish habitat. However, depending on where the ore body is and where tailings can be dumped, significant habitat impacts do occur. Over the past decade enhanced oil and gas exploration and production in the BC north east block has resulted in much road construction impact and the major oil pipeline spill into the Pine River is an ongoing concern for maintaining high water quality.. Of special concern is the BC government's promotion of offshore oil development in the Queen Charlotte Basin. Such development would create another high risk activity in the aquatic ecosystem.

3.4 AQUACULTURE**

Any form of aquaculture that uses the natural environment to raise fish or shellfish impacts that environment's capability of supporting wild fish. Of special concern have been the open net salmon farms and the intensive shellfish operations that scarify beaches for the production of a mono culture crop. The damage occurs on the substrate and in the water column. Shellfish farms cause competition for natural food sources locally and salmon

farms remove large amounts of forage fish from distant waters to serve as a fish food import. Such farms also raise the risk of disease and the introduction of exotic aquatic life forms such as the varnish clam and the Atlantic salmon. In certain areas such as the Broughton Archipelago, salmon farms have acted as rearing and dispersal sites for sea lice which have harmed juvenile wild pink salmon runs in the Central Coast area. Pressure to expand operations will increase the impact on more wild stocks of fish.

3.5 AGRICULTURE**

One of the first significant impacts of agriculture was the dyking of Lulu Island over 100 years ago. Today more and more land is cleared for farming and few areas of BC are immune from the impacts of livestock grazing. A study by the BCFS and DFO documented that grazing cattle actually caused more damage to riparian systems on crown land than logging activities. In many intensely farmed areas, riparian habitat has been totally destroyed by land clearing and farm animals. In the B.C. Interior, most of the water diverted from streams is used by agriculture. As a result, flows for fish are reduced to minimal levels and stream temperatures increase beyond survival levels. In the Lower Mainland and some Vancouver Island areas, agriculture is very intensive and the waste generated far outstrips the environment's ability to assimilate those wastes resulting in water quality degradation. Added to these impacts are the potential deleterious affects of fertilizers and pesticides in the runoff.

3.6 DYKING, DREDGING, FILLING AND CHANNELIZATION**

These activities occur for a number of reasons related to maritime navigation and sand and gravel industries, flood control and often, land development. Most of these activities usually occur in the urban setting along larger rivers and associated estuaries. The cumulative negative impact of these works on rivers such as the Fraser, Squamish and Kitimat has been great. As a result, each of these areas needs substantive restoration to at least partially replace lost habitat.

3.7 DAMS*

Dams are probably the single most destructive in-stream works for fish habitat. Fish migrations are blocked and river habitat is flooded. Few dams are built that do not drastically alter the flow regime of the stream harming downstream habitat for the life of the project. Each dam is a special case. While large hydro dams are of particular concern, the multitudes of small dams built for irrigation or domestic water use also have a substantive cumulative impact on fish habitat. Even private power run of the river dams can alter stream flows and have downstream habitat impacts. Some of these impacts will worsen and conflicts will intensify as human population pressures increase and climate change alters stream flows and temperature regimes.

3.8 HIGHWAYS, ROADS AND OTHER LINEAR FACILITIES (PIPELINES, RAILWAYS, POWER LINES)*

A single well designed bridge over a stream typically has minimal impact. A single road well designed and built will do minimal damage in most watersheds. However, large highways and multiple stream crossings and several linear facilities in one valley such as the Thompson or Coldwater can cause irreversible impacts to stream hydraulics and fish habitat. Linear facility design is especially important and better planning does occur now than two to three decades ago. Unfortunately much of BC has been developed and new mines and other developments will put roads into watersheds that have been spared to date.

3.9 DOMESTIC EFFLUENTS*

With an increase in the human population, the volume of storm water and domestic sewage discharges to fishery waters continually increases. Many sewage treatment plants have been upgraded to the secondary level (e.g. Lulu and Annacis plants) and that higher level of treatment has helped mitigate the impacts of continual volume increases for the time being. However other wastes, such as Victoria's, still receives little to no treatment. As settlement and recreation pressures occur around water bodies such as Shuswap Lake, a greater effort must be put into the appropriate repository of wastes generated in those communities. Additionally, the overall contaminant loading to the environment from storm water discharges generally equals that from domestic sewage. Despite that, little has been done to address the storm water issue in highly developed areas such as the Lower Mainland and Vancouver Island.

3.10 INDUSTRIAL EFFLUENTS AND SPILLS*

Many polluting works such landfills, several coastal pulp mills and Fraser River pole treatment plants have been improved or were shut down over the years. With more effluent connections to regional treatment plants, the load of industrial wastes going untreated directly to our waterways has generally decreased over the past two decades. However this should not create a relaxed attitude. More effort has to go into the monitoring and enforcement of industrial effluents entering sewage treatment systems. High levels of many industrial pollutants such as the heavy metals and chlorinated organics can still be found in the aquatic environment and in fish. Often dead whales such as Orcas are found to be so contaminated that they should be treated as a hazardous waste. Much more action has to be taken in the ongoing evaluation and control of these contaminants. Of great concern, with an increase in industrial traffic, is the risk of catastrophic spills such as the sodium hydroxide spill into the Cheakamus River from a CNR derailment in 2005.

4.0 CONCLUSIONS

The Fisheries Act and its habitat policy and supporting federal and provincial legislation has been modernized over the past two decades, however, the struggle to protect water quality more effectively and maintain a no net loss of fish habitat has not been won. Although habitat conservation has seen improvements, a slow net loss of habitat is still taking place. Often small gains in legislation, technology and practices are undermined by a higher priority to promote increased human settlement and industrial activity. This is often compounded by 'new' habitat protection programs to 'improve' environmental protection without sufficient resources. The balance between development and a sustainable environment has yet to be found.

Fish habitat is typically situated in provincially owned land and waters and industry and waste management are also primarily controlled by the Province, thus it is impossible for the Federal Government to unilaterally protect fish. Indeed, most habitat destruction occurs with provincial sanction or permits such as a forest harvest or a water diversion license or by a provincial agency like BC Hydro or BC Highways or by local government totally under provincial jurisdiction.

Both governments must appreciate that fish and fish habitat and all that that relates to that ecosystem must be managed as an intact ecosystem. A greatly improved cooperative approach between Ottawa and Victoria is essential should intact and developed aquatic ecosystems survive over the next 100 years. It is clear that if we continue to grow and exploit our environment as we have in the past, the future does not look optimistic for aquatic life and indeed the surrounding ecosystem that other forms of life and humans depend upon.

A new unprecedented will and cooperative spirit has to bring together and improve the isolated pieces of legislation to ensure sustainable ecosystem planning and management will occur. To date many efforts in watershed planning have been ineffective and concepts of ecosystem management are simply that.

Of great concern at this time is that programs in stewardship, watershed council development and project review, evaluation and enforcement have been cut by the Federal and Provincial governments at a time when development pressures are greater than ever and the issue of climate change must be aggressively addressed. The fishery and associated aquatic and terrestrial resources do not have the time to wait for slow piece meal solutions to take effect. The plan to sustain the aquatic ecosystem must be as bold as that necessary to address and reverse global warming. Nothing less will succeed.

5.0 RECOMMENDATIONS

5.1 GLOBAL WARMING AND ENHANCED ECOSYSTEM PROTECTION

Associated with the unprecedented urgency to address global warming, a similar and urgent revitalized program is required to protect and more effectively manage aquatic ecosystems from a myriad of major conflicting land and water uses that will cause the eventual demise of many forms of aquatic life and the jobs and enjoyment humans derive from those ecosystems. Any programs to conserve many forms of terrestrial life will also benefit from an improved approach to aquatic ecosystem management and conservation.

5.2 JOINT GOVERNMENT COOPERATION

There has to be a sincere determination by the senior and local governments to protect the aquatic ecosystem more effectively than the approach that often now prevails. The many disjointed pieces of legislation, policy and practices must be brought together and upgraded to truly reflect ecosystem needs and the needs of future generations.

5.3 IMPROVED PERFORMANCE

'Outside of the box thinking' and associated practices are essential to ensure an effective form of ecosystem restoration and conservation will take place. New, assertive and proven approaches must be taken to restore lost or degraded habitat and to protect and manage riparian habitats and natural stream channel integrity. Planned new management approaches of the Province and DFO, including performance based self regulatory approaches with reduced project review and enforcement are attempts of doing the job with fewer resources and at a high risk of failure.

5.4 REDUCE THE HUMAN FOOTPRINT

A radical change is required to reduce the human footprint in new developments. An enhanced environmental management plan should be adopted and enforced whereby the watershed is protected as the foundation of the freshwater ecosystem and the development footprint is isolated in scope. The present approach of isolating smaller areas of habitat for enhanced protection should be reversed.

5.5 INVEST IN ECOSYSTEM CONSERVATION

Resources to enhance a new approach to aquatic ecosystem protection and management supported by an enhanced public and industrial user stewardship program should be restored to at least year 2000 levels. New programs in response to resource cuts such as the DFO EPM Program and the BC Rivers initiatives will have difficulty filling the void.

5.6 URGENT INTERIM ACTIONS

Notwithstanding the above recommendations, interim action must be taken to better address time sensitive environmental issues such as riparian protection and inadequate water flows in many streams considering present unsatisfactory situations for aquatic life will be aggravated by global warming over the next several years.

5.7 PROTECT WETLANDS AND THE COASTAL ZONE

An assertive program should be designed and implemented to protect wetlands as part of the aquatic network and where necessary, resources should be found to acquire wetlands under immediate threat of development. Because few BC estuaries have protection plans in place, an effective coastal zone management plan should be developed which covers all key fish habitats in protection plans including a system of marine conservation areas and reserves. Initially, this must cover areas that will see development over the next few decades.

5.8 EXOTIC SPECIES

Develop and implement an early action plan to properly screen and prevent the introduction of unapproved exotic aquatic species into BC fresh and salt waters. Urgent action is necessary to address well know sources of introduction such as from bilge water dumping, boat transfers, and from the live fish and aquarium trades.

5.9 PLAN FOR CLIMATE CHANGE

There is a present need to relate to and plan for the altered hydrology and temperature increases that will occur in our waterways due to global warming. Also waste management must be re-examined in that present approaches to wastewater discharges will have to be altered to reflect the additional stresses caused by any lowered flows and higher stream temperatures. An overall program is needed to reduce stress to the aquatic ecosystem.

5.10 MORE CRITICAL ANALYSES OF PROJECTS

Because many aquatic systems already have many stressors restricting their health, the cumulative effects of the many smaller existing developments should be critically analyzed to mitigate damage already done and to prevent further burdening aquatic life by new developments in an ecosystem. The need of offshore oil exploration and drilling, new fish farms, coal mines and any major dam must be questioned in terms of the long term sustainability of the environment for future generations. The transportation needs of a society with a neutral carbon footprint should also be examined in the context of new port developments, highways and Vancouver airport expansion. These issues are all directly or indirectly intertwined with the effective conservation and management of a sustainable aquatic ecosystem.

WHAT'S HAPPENING TO WILD SALMON IN YOUR COMMUNITY?

WHAT THE COUNCIL HEARD: NORTH COAST PUBLIC MEETINGS

MARCH 6-8, 2007

Prepared for Pacific Fisheries Resource
Conservation Council by
Dawn Steele and Mark Johannes

MARCH 2008

What's Happening to Wild Salmon in Your Community? What the Council Heard: North Coast Public Meetings March 6–8, 2007

Dawn Steele and Mark Johannes

For quotes and short excerpts from the material covered under "fair use", we recommend the following citation:
Steele, D. and Johannes, M.R.S. 2008. What's Happening to Wild Salmon in Your Community? What the Council Heard: North Coast Public Meetings March 6–8, 2007 Vancouver, BC: Pacific Fisheries Resource Conservation Council.

For further information about this document and about the Pacific Fisheries Resource Conservation Council (PFRCC), contact:
Pacific Fisheries Resource Conservation Council
290–858 Beatty Street
Vancouver, BC V6B 1C1
CANADA
Telephone 604 775 5621
Fax 604 775 5622
www.fish.bc.ca
info@fish.bc.ca

Printed and bound in Canada

ISBN 1-897110-39-1

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1. THE PFRCC'S APPROACH TO DISCUSSING 'WHAT'S HAPPENING TO WILD SALMON IN YOUR COMMUNITY?'

1.1 BACKGROUND

Since its inception, the Pacific Fisheries Resource Conservation Council (PFRCC) has sought to hear from communities, First Nations, commercial and recreational fishing interests, stewards and other interested groups and individuals around British Columbia on the state of wild Pacific salmon and their habitat. Communities of place and interest have a wealth of knowledge, with local and regional perspectives that are critical to understanding and managing issues relating to wild salmon. Council members have recognized the value of such dialogues. The knowledge thus derived is invaluable in helping the PFRCC to develop strategic work plans that address issues of interest and concern for B.C.'s wild salmon stocks, and reports that advise the federal and provincial Fisheries Ministers and the public on the state of wild Pacific salmon stocks and habitat.

1.2 OPPORTUNITIES FOR PUBLIC INPUT

The North Coast meetings represented the third PFRCC regional tour so far in an ongoing series that seeks to share information with communities and to receive their knowledge and views on the state of wild Pacific salmon and their habitat. The current series began with a tour of Vancouver Island during March 2006, with public meetings in Port Hardy, Campbell River, Duncan and Port Alberni. A visit to the BC Interior in October 2006 included public meetings in Penticton and Kamloops. The March 6–8, 2007 North Coast tour included public meetings in Smithers, Terrace and Prince Rupert. Times and venues for the public meetings were promoted through local contacts and groups, e-mail, posters, media advisory and press releases. PFRCC will continue its community meetings at various locations in BC during 2008 and beyond.

The goals of PFRCC's 2006–08 community meetings are to:

- Share information on natural and human influences on wild salmon;
- Gather local knowledge; and
- Compile information and ideas to help PFRCC develop and provide advice to government and the public and to help shape future Council activities.

1.3 MEETING FORMAT

Agendas for these public meetings are designed to provide a variety of opportunities for comment and discussion. The formal portion of each public meeting is preceded by an hour-long open house, with poster presentations and opportunity for informal one-on-one discussion with PFRCC members and staff.

The formal meeting begins with introductions and a very brief PRFCC presentation highlighting issues relating to wild salmon, including climate change, land and water use, and a sampling of known local salmon stock and habitat issues. Participants are then invited to comment on local issues, with a PFRCC reporter on hand to record and synthesize this feedback. Council members moderate this portion of the meeting to encourage participation and ensure a fair opportunity for any participant who wishes a chance to speak.

Participants are then invited to work in groups, using large table maps to identify areas of interest, record comments and prioritize local wild salmon issues and solutions. PFRCC council members and staff facilitate table discussions and each group is invited to briefly report back. The information recorded on the table maps is later collated.

Comment sheets provide further opportunity to address the following four key questions and to add further remarks:

1. How are wild salmon stocks doing in your area relative to other parts of the coast?
2. How are changes in the marine and freshwater environments affecting salmon stocks in your area? (e.g., increases in water temperatures, stream and river flows, salinity, etc.)?
3. What is the impact of changes in water use and land use on salmon stocks and their habitat?
4. What does this mean for salmon management? What needs to be done to adapt to these changes?

Finally, participants are also invited to provide additional comments directly to the Council recorder, to Council members and staff present and/or to provide written or e-mail submissions to address issues and concerns not covered in the public meetings.

Council members have found these discussions to be candid and valuable. This report provides a summary of the feedback captured at the North Coast meetings, highlighting many of the important ideas and themes that were heard.

2. SYNOPSIS OF PUBLIC MEETINGS

The following summarizes participation and feedback from the three North Coast community meetings in Smithers, Terrace and Prince Rupert.

2.1 PARTICIPATION

- Smithers, March 6, 2007: 37 participants
- Terrace, March 7, 2007: 61 participants
- Prince Rupert, March 8, 2007: 55 participants

The three meetings drew interest and participation from a variety of groups and individuals (Table 1). Relative to public meetings on Vancouver Island and the BC Interior, there was significantly higher representation at all three meetings from individuals and organizations concerned about the impacts of industrial development and aquaculture on regional wild salmon stocks, habitat and fisheries. Meetings in Smithers and Terrace drew relatively greater participation from First Nations and the sport fishing sector, while Prince Rupert heard from more commercial fishing interests.

TABLE 1. Identified affiliation (%) of community participants in North Coast meetings (some participants did not record their affiliation; some also recorded multiple affiliations).

Affiliation	Smithers %	Terrace %	Prince Rupert %
Salmon stewardship	5%	3%	4%
Hatchery	3%	3%	
First Nation	8%	11%	5%
Sport fishing	14%	7%	7%
Commercial fishing	8%	5%	20%
Environment/conservation	14%	3%	9%
Community group	8%	5%	
Prov / Fed / Local government	5%	5%	2%
Business/industry		2%	
Elected / political officials	3%	2%	5%
Public		2%	7%
Media	3%	2%	3%
Other	3%		

2.2 EVALUATION OF THE PURPOSE AND PROCESS

In addition to completing comment forms, all participants were strongly encouraged to complete an evaluation form. Ten evaluation forms were submitted for the Smithers meeting, along with 28 for Terrace and 29 for Prince Rupert. On average, participants rated all three meetings as Satisfactory to Very Good overall. Most also reported that the agenda and purpose of the meeting were clear (56 of 60 responses), although some felt there could have been more clarity about next steps and how the information provided would be put to use. Meeting aspects that received the highest satisfaction ratings were the discussion and the opportunity to share local knowledge and concerns (Satisfactory to Very Good, on average). Poster displays received the lowest ranking (just Satisfactory, on average). The most frequent positive comment was that the meeting was informative (39 votes); the most frequent negative comment was that it was too short (9 votes).

Some participants said they would have preferred a more in-depth or less simplistic Council presentation and/or more time for community input. However, several also expressed appreciation for a format that focused most available time on listening to participant input. Suggestions included the need to encourage broader representation at such meetings, such as individuals representing commerce and industry, local government and other Ministries whose mandates affect wild salmon.

2.3 HIGH PRIORITIES ISSUES FOR COMMUNITIES

Comments from communities on local salmon stocks and habitats were compiled into tables and maps as a summary of all dialogue heard by PFRCC (Appendix I, Tables A1-A and A1-B, Maps A1-A and A1-B). Comments on local and regional salmon stock and habitat issues were assigned a low, medium and high level of priority. Priorities were set based on:

1. Frequency with which comments were heard;
2. Priority assigned by participants themselves; and
3. Lack of disagreement/evidence of consensus

High priority issues reflect high levels of expressed concern, a status for salmon stocks and habitats which is seen as poor relative to historic levels, and/or the perception that management and information are insufficient to address serious risks. Medium priority issues reflect some public concern that salmon stocks and habitats need attention, that stock and habitat status are declining or at risk and that there may be insufficient information or resources to fully understand and address the issue. Low priority issues reflect comments that problems in salmon stocks and habitats exist, but that the issues are being addressed or else do not pose significant risks at this time.

The council heard the following high priority comments during community meetings.

SMITHERS

Public feedback in Smithers suggested that industrial development (especially plans for mining and coal bed methane development) and aquaculture are very high priority issues. Concerns include pollution and impacts on water quality, habitat and local salmon populations, as well as the resulting impacts on resource-dependent communities and especially First Nations. Many participants voiced concern about the failure to consider cumulative impacts of a massive proposed expansion in industrial development, along with shipping, pipelines and rail traffic, plus logging, agriculture, mixed stock fishing, etc. Many also felt that neither the Province nor

DFO were living up to obligations to manage risks from industrial development in ways consistent with the desire to conserve wild salmon populations. Particular concern was expressed about proposed coal bed methane development and other industrial development in the Telkwa and "Sacred Headwaters" regions.

A number of participants also expressed concern about significant cutbacks in monitoring and assessment of wild salmon populations and inadequate support for local stewardship.

On stock status, most concerns focused on declining Chinook stocks in the upper Skeena tributaries, such as the Morice, Bear and Bulkley Rivers. Several also reported some chum, coho, pinks and/or sockeye runs being down in the smaller systems, but in general most felt that stocks overall were doing quite well, apart from Morice Chinook. Concern was also voiced over commercial fishing impacts on steelhead and Provincial policies that permit tagging but not enumeration of returning steelhead.

TERRACE

Feedback in Terrace indicated that cutbacks leading to inadequate stock assessment, and impacts associated with commercial and recreational fisheries and logging practices were high priorities. Impacts of proposed development, including aquaculture, mining, pipelines, oil and gas and increased shipping traffic were also repeatedly cited as high priority concerns.

Recreational tidal water catch limits and fishing practices (coho fishing derby, lodges, guided helicopter fishing in the headwaters, back trolling for Chinook) were cited as concerns, along with impacts of commercial mixed stock fishing on steelhead in particular, and inadequate enforcement. Many speakers conveyed concerns about growing pressures on local resources for the benefit of outsiders, with local communities and especially resource-dependent First Nations paying the price. Frustration was expressed that no one was listening to local voices and that political will was lacking to address these concerns. A recurring theme was the failure of governments to consider the total capacity of river systems and address cumulative impacts of all these pressures, especially in context of added risks posed by climate change.

Again, comments indicated participants viewed current stock status for most populations as mostly good, with some exceptions. Several Skeena sockeye stocks are down, including Kitwanga and Lakelse sockeye, which was identified as the third most endangered. Declining populations in Lakelse Lake and surrounding creeks was blamed on logging and habitat disturbance. Some problems were also noted for pink and chum, along with a sharp decline in steelhead in Kitimat.

PRINCE RUPERT

Feedback in Prince Rupert reflected many of the same high priority concerns, including plans for aquaculture, port/shipping expansion, oil & gas and other large-scale industrial development, as well as ongoing impacts from logging. Once again, participants emphasized that current processes do not consider or address the cumulative impacts of such developments, plus the new pressures and uncertainty posed by climate change. Once again, there was also much concern about all this happening in the context of declining ability to monitor and assess stocks and to understand what is happening in the natural environment.

Participants in Prince Rupert also voiced many concerns about fisheries management, management policies and approaches, and the ability to manage fisheries in general. Several again complained that the Coho fishing derby held the previous summer was inappropriate, after so much effort was put into rebuilding coho stocks.

Again, many participants also expressed concern that local voices weren't being heard and that local resources were being "sold out". There were appeals for less emphasis on money, more effort to manage risks, a more

balanced, holistic approach to management and development that is sustainable, consistent with wild salmon conservation and more focused on benefits to local communities.

Several participants also expressed concern about growing predation from whales, seals and sea lions. A common theme underlying many comments was concern about the declining commercial fishery and the resulting impact on dependent communities like Prince Rupert. Some felt that commercial fishermen were being unfairly blamed and penalized for problems caused by other factors, such as upstream logging impacts.

Again, feedback in Prince Rupert reflected a general sense that most stocks were doing well relative to other parts of the province. The rebuilding of coho was cited as a success story, though there were some concerns about commercial impacts on summer-run coho. Kitwanga sockeye recovery was cited as another positive initiative, with returns back up to 5,000 despite run timing that coincides with the commercial fishery on enhanced Babine sockeye. Declining Lakelse sockeye was again noted as a key concern.

2.4 IMPORTANT ISSUES RELATING TO WILD SALMON POPULATIONS

Issues of importance that participants reported as affecting or potentially affecting regional wild salmon populations can be summarized under the following key themes:

- **Industrial development:** Concern about the risks posed by numerous and/or large-scale industrial development proposals for the region was heard repeatedly in each of the three communities. Concerns included impacts of mining, oil and gas development (including offshore oil and gas and coal bed methane), new pipelines, port development, shipping/tanker traffic and expansion of rail traffic. Comments reflected a lack of confidence in government's ability and will to regulate and manage risks, concern about failures to consider the views of local communities and First Nations, incompatibility of plans with conservation of wild salmon populations, and a perceived need for more sustainable development and more holistic, balanced approaches.
- **Fish farming:** Participant comments were almost universally opposed to open net pen fish farming, and it was noted that opinion polls show very high regional opposition to salmon aquaculture. One participant however noted that resource-dependent First Nations communities might have no other choice, if access to traditional fisheries continues to be reduced.
- **Logging:** Logging impacts on salmon habitat, stream hydrology and water quality were cited as concerns, along with management approaches that emphasize self-regulation by the industry. Participants said logging impacts were found to be a key contributing factor in placing populations such as Lakelse sockeye at risk.
- **Salmon fisheries:** Most concerns focused on impacts of fishing practices seen as exploitative, irresponsible or overly intensive, in both the commercial and recreational fisheries. Concerns relating to commercial fisheries included mixed stock fishing impacts on weak stocks; greater efficiency of commercial fleets and new pressures from boats moving north; impacts of mesh size on population genetics; and impacts of troll and seine fishing. Recreational fishing issues included tidal water limits, coho fishing derby, expansion of guided and lodge fishing, helicopter fishing in upper tributaries and practices like back trolling for Chinook. There were also concerns over management of the commercial fishery and reduced commercial fishing opportunities, with resulting impacts on dependent communities like Prince Rupert and many First Nations. Nisga'a fisheries management was cited as a successful model.

- **Cumulative impacts:** This was a recurring theme, with many participants concerned that existing approaches to managing fisheries and development are inadequate in that they consider impacts of particular activities too narrowly, with no consideration of cumulative impacts, upstream/downstream impacts and/or total river capacity.
- **Funding:** Many participants voiced concern about reduced funding for local monitoring, assessment and stewardship activities, and reduced resources for science in general. There was concern about a reduced ability to identify and understand potential problems at a time when wild salmon populations face growing risks.
- **Climate change:** A number of participants also noted climate change as a significant new challenge that would enhance uncertainty and risk in efforts to manage and conserve wild salmon.
- **Local control:** Many participants saw community stewardship and collaborative, watershed-based community management as critical to addressing challenges and conserving wild salmon populations over the long term. However, a recurring theme was a sense of frustration that local voices were not being heard and that local knowledge and local advice was not being considered in decision-making.
- **Governments' ability to protect salmon:** Many participants expressed the view that both the Provincial and Federal governments lacked the political will and/or capacity to successfully manage development and risks to wild salmon. DFO's Environmental Protection Modernization Process, for example, was perceived to be about lessening protection to facilitate development. Provincial forestry management and the environmental assessment process were other areas of concern.
- **Ecosystems:** A number of participants expressed concern about the need for better understanding of ecosystems. One participant stressed the complex and dynamic nature of the Skeena ecosystem, while others noted the need to study the marine environment and for more consideration of biodiversity. Concerns about ecosystem imbalance were also reflected in comments about unusual numbers of whales, seals and sea lions and associated predation impacts.
- **Stock status:** In general, most participants felt that most regional stocks were doing relatively well, compared to elsewhere in the Province. Areas of particular concern included declining Chinook returns to upper Skeena tributaries like the Morice; some Skeena sockeye stocks, particularly Lakelse Lake sockeye; and steelhead.

2.5 LOCAL SOLUTIONS

The council also heard examples of success, suggested solutions and potential approaches for better management of wild salmon and their habitat. Below are listed the key themes.

- **Local control:** One of the strongest recurring themes in all three communities was an appeal for more local control of resource management for the long-term benefit of local communities. Proposals included collaborative watershed management approaches that include all stakeholders, including industry, forestry, etc. Models included the North Coast Fisheries Council established under the Fisheries Renewal program and an initiative in which 92 First Nations came together to manage issues on the Yukon River. Nisga'a fisheries management was also cited as a very successful example. Many participants felt that local voices were not being heard in fisheries management and especially in regional development planning, and that greater local control was the key to managing development and resources sustainably for the long-term benefit of local communities.

- **Collaboration:** Many participants called for greater collaboration among local interests that have traditionally competed with each other. Several cited examples of successful collaborative efforts, such as an initiative involving the Wetsu'wet'en, a local hatchery and DFO to restore a local stock. A similar collaborative effort that was cited as a successful model was the Lakelse sockeye recovery initiative.
- **Holistic approaches:** This theme was restated in various ways, with appeals for more balanced or holistic approaches to development planning and fisheries management, multi-stakeholder collaboration, and ecosystem/watershed approaches. Participants stressed the need to develop a better understanding of complex ecosystems, particularly in the context of new challenges from development and climate change. Some urged more emphasis on biodiversity and consideration of salmon as an indicator of broader ecosystem health, not just a resource. There were also numerous calls for new approaches to managing development and fisheries impacts on wild populations that would consider upstream/downstream and cumulative impacts. For example, the Headwaters Initiative, a community-based effort, is currently mapping proposed developments in the region to highlight cumulative impacts.
- **Improved monitoring/assessment:** All communities expressed concern about cutbacks and urged more resources to support stock assessment and monitoring, along with more emphasis on science and local community stewardship. Several challenged Provincial policies that permit tagging, but not enumeration, of steelhead. Participants argued that without better monitoring and assessment, it will be impossible to manage salmon sustainably at a time when threats to wild populations in the region are increasing significantly.
- **Fisheries practices:** A number of participants were concerned about conservation impacts of both recreational and commercial fisheries and fishing practices and called for more selective, responsible and sustainable approaches. Commercial fishing representatives said great strides had been made in avoiding weak stocks and several expressed the view that the commercial fishing sector was being unfairly blamed and penalized for impacts of logging and development. Participants also called for better enforcement.
- **Climate issues:** A number of participants commented on climate change impacts as introducing new risks to salmon populations and greater uncertainty to management. Participants saw a need for more assessment, more understanding of complex ecosystems and more precautionary approaches that consider the combined or cumulative risks to wild stocks and habitat.

3. CONCLUDING REMARKS

The PFRCC has benefited from listening to comments and perspectives on local salmon issues during our meetings. The Council appreciates the passion and ideas that communities have shared and the issues we face in maintaining healthy salmon stocks and habitats. The PFRCC will continue this discussion with other communities across B.C. in support of healthy salmon populations and high quality habitat, and will share the information obtained with federal and provincial fisheries ministers and with the public.

APPENDIX 1: SUMMARY OF PUBLIC COMMENTS

A summary of public comments received during North Coast meetings in Smithers, Terrace and Prince Rupert. Tables and mapped comments represent public comment recorded on PFRCC community maps.

Comments on local and regional salmon stock and habitat issues were assigned a low, medium and high level of priority. Priorities were set based on:

1. Frequency with which comments were heard;
2. Priority assigned by participants themselves; and
3. Lack of disagreement/evidence of consensus.

High priority issues reflect high levels of expressed concern, a status for salmon stocks and habitats which is seen as poor relative to historic levels, and/or the perception that management and information are insufficient to address serious risks.

Medium priority issues reflect some public concern that salmon stocks and habitats need attention, that stock and habitat status are declining or at risk and that there may be insufficient information or resources to fully understand and address the issue.

Low priority issues reflect comments that problems in salmon stocks and habitats exist, but that the issues are being addressed or else do not pose significant risks at this time.

Summary of comments, assigned priority, and numbered maps for items shared in (A) Smithers and Terrace and (B) Prince Rupert.

TABLE A1-A. Smithers and Terrace public comments, March 6 and 7, 2007.

Map #	Priority	Public Concern
1	Medium	Overcrowded angler docks need to be relieved by adding more boat launchers or by re-opening previous angler sites (i.e., Exchamsika River)
2	High	Negative impacts of increased numbers of fish farms on salmon and salmon habitat (i.e., spread of sea lice, polluted waters)
3	High	Impacts of proposed pipeline development on salmon-bearing streams (i.e., CBM Pembina and Enbridge pipelines)
4	Low	Near Tahsta Lake—closure of well-managed forestry campsites
5	Low	Houston pump—impact of garbage from Smithers being dumped near rivers
6	High	Unregulated, out-of-control commercial fisheries impact on salmon stocks, especially coho
7	Medium	Low steelhead numbers
8	Low	Hecate Strait—oil/gas development impacts on salmon stocks
9	Low	Cumulative impacts of chemicals from human activities (i.e., pesticides, industrial waste) entering oceans
10	Medium	Increased CN traffic to port and poor derailment record; needs improved track maintenance
11	High	Smithers—Blue Pearl molybdenum mine releasing discharge (i.e., Arsenic) into Bulkley River
12	Medium	Copper mining and tailing pond discharge into salmon-bearing streams
13	Low	Skeena River—cumulative impacts of difference mining activities on water characteristics
14	High	Bulkley River—impacts of agriculture (i.e., cattle in rivers, pesticide discharge into rivers, habitat loss) on rivers
15	Low	Smithers—sewage leaching from old mills and logging practices into salmon-bearing streams
16	Medium	Increase in diseased salmon (i.e., sea lice, cysts), especially coho and pink
17	High	Increase in coal bed development and coal bed methane
18	High	Salmon stock management issues, especially coho, chinook and sockeye; need to use tags to track source of salmon fishery
19	Medium	Impact of unregulated sport and aboriginal fisheries on salmon stocks
20	Medium	Impacts of logging on river characteristics (i.e., runoff times, riparian zones)
21	Low	Houston—contamination of country foods (i.e., heavy metals, endocrine-disrupting chemicals)

MAP A1-A. Summary of comments and priorities heard by the PFRCC in Smithers, March 6, 2007 and Terrace, March 7, 2007.

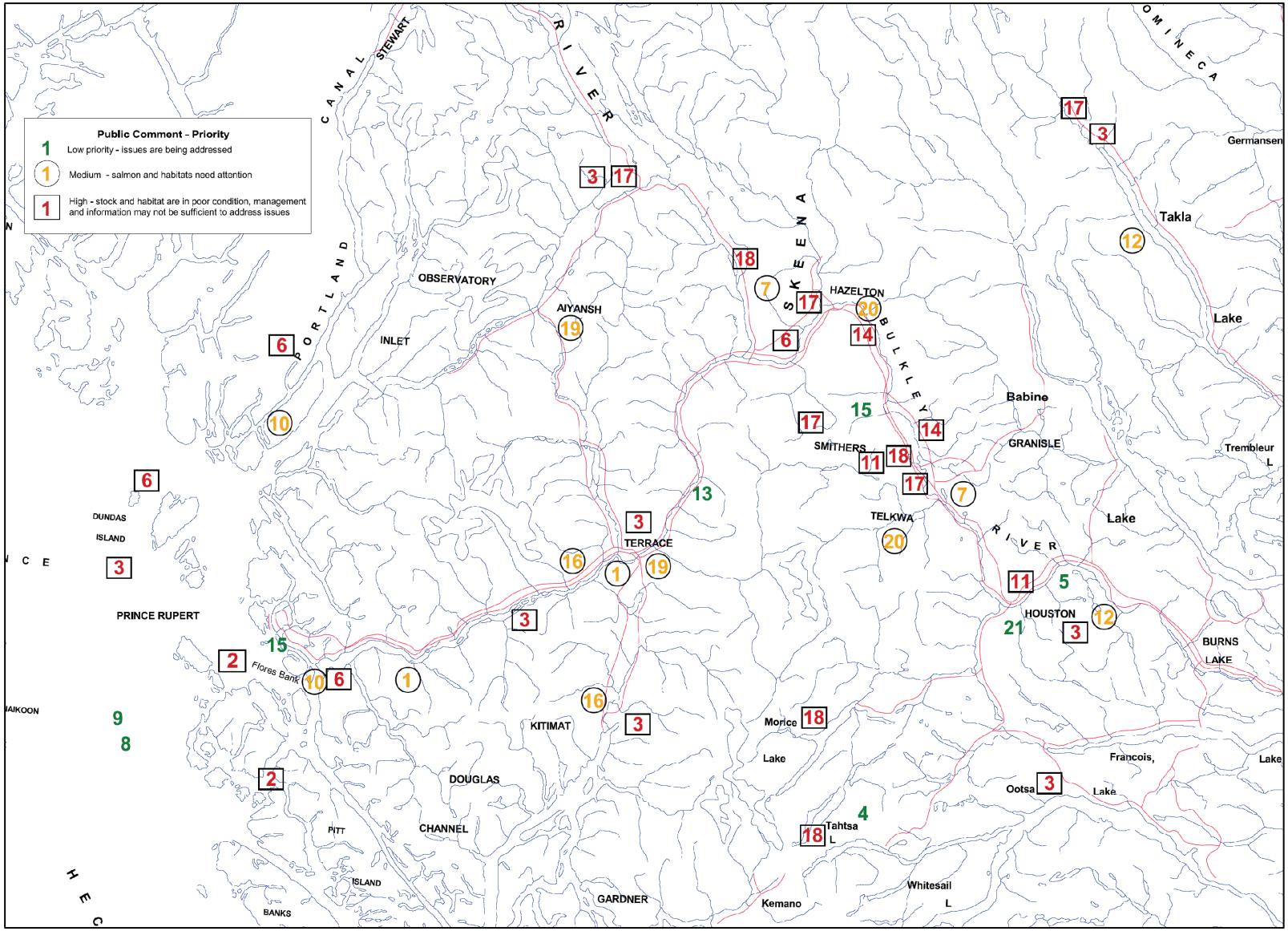
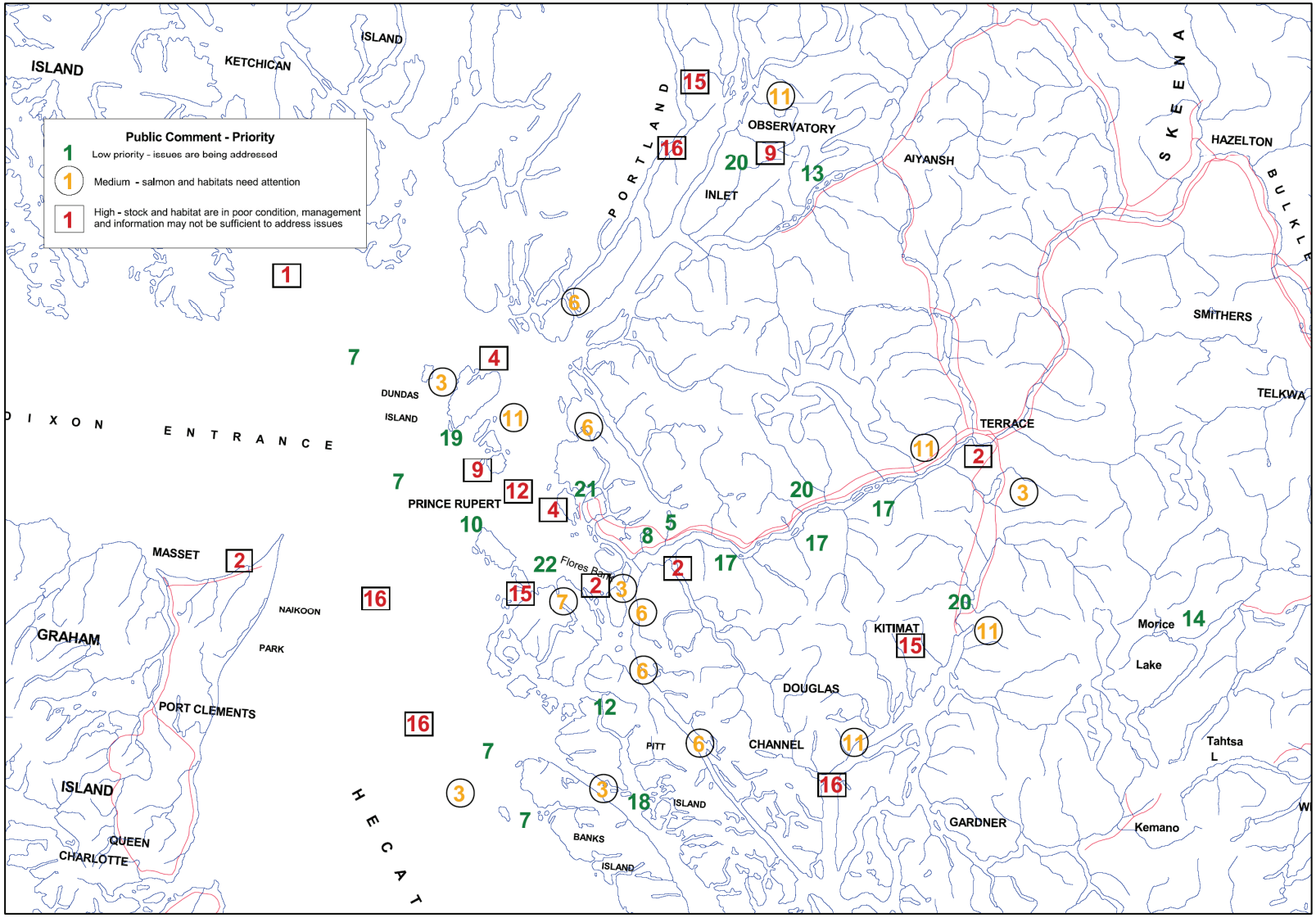


TABLE A1-B. Prince Rupert comments, March 8, 2007.

Map #	Priority	Public Concern
1	High	Lack of collaborative management of salmon fisheries between the BC and Alaskan governments
2	High	Significant increase in sea lion population size impacts salmon stocks
3	Medium	Low salmon stocks (i.e., coho, sockeye, pink), especially at the juvenile stage; need to make use of local management models (e.g., Alaska's management model) to manage stocks effectively
4	High	Limitations need to be set on sport and aboriginal fisheries, especially halibut and coho
5	Low	Skeena River mouth—impacts of ATV use around salmon-bearing streams
6	Medium	Lack of fish-bearing stream classification and mapping along coast
7	Medium	Need for creating a thorough inventory of salmon stocks through monitoring programs along coast and in salmon spawning streams
8	Low	Skeena River mouth—impacts of high numbers of sport fishers in single area; need to create more fishing areas by stocking lakes
9	High	Need for more hatcheries and more funds for existing hatcheries
10	Low	Prince Rupert—lack of enforcement of salmon habitat regulations impacts on salmon stocks
11	Medium	Degraded salmon-bearing streams need to be enhanced (e.g., Skeena River)
12	High	Impacts of open net pen fish farms on wild salmon stocks; need to be replaced by land-based fish farms
13	Low	Naikon Park—need to establish local research facilities
14	Low	Morice Lake—potential pipeline development impacts on juvenile salmon rearing habitat
15	High	Port developments impact juvenile salmon rearing habitats
16	High	Increased vessel (e.g., cruise ships, tankers) traffic impacts on juvenile salmon rearing habitat
17	Low	Skeena River—highway/rail corridors impacts on juvenile salmon rearing habitat
18	Low	Pitt Island and Banks Island—proposed oil/gas and wind farm developments impacts to wildlife and important salmon spawning streams
19	Low	Dundas Island—corridor study on euchalon showed the importance of euchalon as a food source to salmon; need to protect euchalon habitats
20	Low	Lack of logging buffers near salmon-bearing streams impacts stream characteristics (i.e., runoff)
21	Low	Prince Rupert—minimize the commercial fishing of by-catch steelhead and coho; stocks are decreasing
22	Low	Prince Rupert—commercial drag fishing impacts inshore water habitats

MAP A1-B. Summary of comments and priorities heard by the PFRCC in Prince Rupert, March 8, 2007.



WHAT'S HAPPENING TO WILD SALMON IN YOUR COMMUNITY?

WHAT THE COUNCIL HEARD: MID AND UPPER FRASER PUBLIC MEETINGS

OCTOBER 16–18, 2007

Prepared for Pacific Fisheries Resource
Conservation Council by
Dawn Steele

JULY 2008

What's Happening to Wild Salmon in Your Community? What the Council Heard: Mid and Upper Fraser Public Meetings October 16–18, 2007

Dawn Steele

For further information about this document and about the Pacific Fisheries Resource Conservation Council (PFRCC), contact:
Pacific Fisheries Resource Conservation Council
290–858 Beatty Street
Vancouver, BC V6B 1C1
CANADA
Telephone 604 775 5621
Fax 604 775 5622
www.fish.bc.ca
info@fish.bc.ca

Printed and bound in Canada

ISBN 1-897110-41-3

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1. THE PFRCC'S APPROACH TO DISCUSSING 'WHAT'S HAPPENING TO WILD SALMON IN YOUR COMMUNITY?'

1.1 BACKGROUND

Since its inception, the Pacific Fisheries Resource Conservation Council (PFRCC) has sought to hear from communities, First Nations, commercial and recreational fishing interests, stewards and other interested groups and individuals around British Columbia on the state of wild Pacific salmon and their habitat. Communities of place and interest have a wealth of knowledge, with local and regional perspectives that are critical to understanding and managing issues relating to wild salmon. Council members have recognized the value of such dialogues. The knowledge thus derived is invaluable in helping the PFRCC to develop strategic work plans that address issues of interest and concern for BC's wild salmon stocks, and reports that advise the federal and provincial Fisheries Ministers and the public on the state of wild Pacific salmon stocks and habitat.

1.2 OPPORTUNITIES FOR PUBLIC INPUT

The Mid and Upper Fraser meetings represented the fourth PFRCC regional tour so far in an ongoing series that seeks to share information with communities and to receive their knowledge and views on the state of wild Pacific salmon and their habitat. The current series began with a tour of Vancouver Island during March 2006, with public meetings in Port Hardy, Campbell River, Duncan and Port Alberni. A visit to the BC Interior in October 2006 included public meetings in Penticton and Kamloops. The March 2007 North Coast tour included public meetings in Smithers, Terrace and Prince Rupert, while the October 16–18, 2007 Mid and Upper Fraser tour included public meetings in Prince George, Quesnel and Williams Lake. Times and venues for the public meetings were promoted through local contacts and groups, e-mail, posters, media advisory and press releases. PFRCC will continue its community meetings in the winter 2008 with public meetings to be held in Fort Langley and Sechelt.

The goals of PFRCC's community meetings are to:

- Share information on natural and human influences on wild salmon;
- Gather local knowledge; and
- Compile information and ideas to help PFRCC develop and provide advice to government and the public, and to help shape future Council activities.

1.3 MEETING FORMAT

Agendas for these public meetings are designed to provide a variety of opportunities for comment and discussion. The formal portion of each public meeting is preceded by an hour-long open house, with poster presentations and opportunity for informal one-on-one discussion with PFRCC members and staff.

The formal meeting begins with introductions and a very brief PFRCC presentation highlighting issues relating to wild salmon, including climate change, land and water use, and a sampling of known local salmon stock and habitat issues. Participants are then invited to comment on local issues, with a PFRCC reporter on hand to record and synthesize this feedback. Council members moderate this portion of the meeting to encourage participation and ensure a fair opportunity for any participant who wishes a chance to speak.

Participants are then invited to work in groups, using large table maps to identify areas of interest, record comments and prioritize local wild salmon issues and solutions. PFRCC council members and staff facilitate table discussions and each group is invited to briefly report back. The information recorded on the table maps is later collated.

Comment sheets provide further opportunity to address the following four key questions and to add further remarks:

a) How are wild salmon stocks doing in your area relative to other parts of BC?

b) How are changes in the marine and freshwater environments affecting salmon stocks in your area?

c) What changes are needed to make positive improvements to freshwater environments to help sustain salmon?

d) What is the major salmon management challenge in your area?

Finally, participants are invited to provide additional comments directly to the Council recorder, to Council members and staff present, and/or to provide written or e-mail submissions to address issues and concerns not covered in the public meetings.

Council members have found these discussions to be candid and valuable. This report provides a summary of the feedback captured at the Mid and Upper Fraser meetings, highlighting many of the important ideas and themes that were heard.

2. SYNOPSIS OF PUBLIC MEETINGS

The following summarizes participation and feedback from the three Mid and Upper Fraser community meetings in Prince George, Quesnel and Williams Lake.

2.1 PARTICIPATION

Prince George, October 16, 2007: 26 participants
Quesnel, October 17, 2007: 18 participants
Williams Lake, October 18, 2007: 36 participants

The three meetings drew interest and participation from a variety of groups and individuals (Table 1). Relative to public meetings on the North Coast and the BC Interior, there was higher representation of individual sport anglers and guides. In Prince George, particularly, a number of attendees' comments related to the Skeena watershed. Meetings in Quesnel and Williams Lake drew relatively more participants from the stewardship community, environmental/ conservation groups and other community groups. No participants self-identified as representing the commercial fishing sector in any of the three communities.

TABLE 1. Identified affiliation (%) of community participants in Mid and Upper Fraser meetings (some participants did not record their affiliation; some also recorded multiple affiliations).

Affiliation	Prince George	Quesnel	Williams Lake
Salmon stewardship		15%	10%
Hatchery			
First Nation	7%		10%
Sport fishing	30%	10%	20%
Commercial fishing			
Environment / conservation		15%	20%
Community group		10%	7%
Prov / Fed / Local government		5%	10%
Business / industry			5%
Elected / political officials			10%
Public	15%	5%	5%
Media	4%	5%	2%
Other	4%	10%	5%

2.2 EVALUATION OF THE PURPOSE AND PROCESS

In addition to completing comment forms, all participants were strongly encouraged to complete an evaluation form. Sixteen evaluation forms were submitted for the Prince George meeting, along with nine for Quesnel and 26 for Williams Lake. On average, participants rated all three meetings as Satisfactory to Very Good overall; a substantial number of Williams Lake participants rated the meeting as excellent. Ninety percent of all participants reported that the agenda and purpose of the meeting were clear; half of those who responded negatively (10%) felt that the lack of clarity was in the pre-meeting publicity but that the purpose was made clear when the meeting began. Meeting aspects that received the highest satisfaction ratings were the discussions (whole group and round table) and the opportunity to share local knowledge and concerns (Satisfactory to Excellent, on average). The displays and presentations were only slightly less well received (Satisfactory to Very Good). The comments were overwhelmingly positive, with the most frequent positive comments being that the meetings were informative (35 votes), organized (30 votes) and stimulating (20 votes). On a total of 51 comment forms, there were only eight negative comments, suggesting that the overall organization and execution of the meetings were appreciated by the participants.

There were few additional comments, although one participant noted that more questions were asked than answered. About half of those submitting comment forms expressed a need for broader participation in such meetings, particularly by politicians and government employees. There was frustration regarding low participation by individuals representing First Nations, ranching, mining and forestry.

3. WHAT THE COUNCIL HEARD

3.1 PRIORITY ISSUES FOR COMMUNITIES

Comments from communities on local salmon stocks and habitats were presented to Council via the open discussions, via comment forms given out during registration and via the mapping exercise. These comments are summarized below with the information on the maps separately presented in Appendix 1 (Tables 1 to 5, Maps 1 to 5).

The three areas of highest priority were declining returns, habitat protection and regulatory/management/policy issues. Participants expressed concern about many habitat-protection issues, such as impacts from forestry and the Mountain Pine Beetle infestation, effluent from pulp mills and mines, impacts from agriculture and ranching, urban development, power production and overall water management. On the other hand, it was also noted that declining returns due a combination of challenges (management of downstream fisheries, ocean conditions, climate change) meant that a significant amount of upstream habitat was not being used, and that this therefore offered opportunity for enhancement. Many participants were, however, skeptical about the necessary will and capacity at all levels of government to address these issues through stronger policies (e.g., amendment to the *Water Act*) and enforcement of existing policies and regulations. Participants also stressed the socioeconomic importance of salmon runs to both First Nations and those who make a living from fishing-related tourism. Lower priority issues included introduced exotic species (bass) and fish farm impacts. As on the North Coast, participants emphasized the importance of considering the cumulative impact of multiple threats facing wild salmon.

The council heard the following comments during community meetings.

PRINCE GEORGE

Discussion focused heavily on concerns regarding fisheries management. Participants expressed concern about declining returns of Fraser chinook and sockeye (Bowron, Early Stuart, Nadina, Late Stuart and Stellako), and also about low coho runs on the Skeena. There was little or no opportunity for a First Nations food fishery in 2007. Fishing-related tourism is also seen as being under threat. There was concern about management of downstream/ocean fisheries (recreational and commercial), with one attendee noting that decisions are based on return estimates at Mission that are off by up to 50 percent each year. Several also noted that productive upstream habitat is not being utilized due to low escapement.

Participants also called for increased emphasis on research and habitat protection, improved inter-ministerial and inter-departmental communication and cooperation, more aggressive responses to industrial pollution, and changes to forestry practice.

As examples, participants stated concerns about:

- "Wretchedly" poor planning and a lack of knowledge within the Prince George Council;
- Pollution caused by zinc oxide from galvanized steel culverts and treated dock wood;
- Impacts of the planned expansion of the Kemano Dam on local river systems;
- Alcan's management of summer flooding on the Nechako;
- Proposals for 20 new fish farms at the mouth of the Skeena; and
- Environmental impact of the new container port at Prince Rupert.

In addition, significant concern was expressed regarding the mountain pine beetle. Because each pine tree soaks up 40 to 60 litres of water daily, the cumulative loss of trees is causing "flashier" run-offs, which is in turn increasing erosion of riverbanks. This is compounded by damage incurred by foresters while trying to recover beetle-killed wood.

Finally, the economic importance of the sport fishery, and particularly the international dollars it attracts, was noted. Members of international conservation groups have expressed concern and a desire to help. It was suggested that a process should be considered for notifying this community regarding proposals to build fish farms, exploit coal bed methane or expand logging.

QUESNEL

Here again, concerns focused heavily on management and protection of fish habitat. For example, concern was expressed that federal, provincial and local regulations are not being enforced. This was not blamed on local DFO officers, who were described as "great." Stewards also said that shifting priorities at higher levels can hamper volunteer efforts and lead to unstable funding.

Located at the epicentre of the mountain pine beetle crisis, with an economy heavily dependent on forestry, the Mayor of Quesnel nevertheless identified the beetle's impact on hydrology and salmon as a key issue for his community. He stressed the need for education and awareness, noting that salmon are so important and yet so undervalued.

A great deal of conflict and inconsistency was noted regarding water management. Provincial range policy allows cattle to go right into rivers, including spawning beds. While some ranchers are trying to improve their environmental practices, assistance is lacking for those who wish to move forward. The *Water Act* does not require allocation of water for salmon. At the same time, conflicting regulations for mining and forestry permit miners to remove trees closer to the water in riparian zones and to replant only grass. With "huge" mining claims in the area, this could have significant impact.

Participants called for more study regarding the impact of mountain pine beetle impacts on salmon, climate change, ecosystems (e.g., eulachon declines) risks posed by introduced small mouth bass, salmon farming and sea lice. The need for increased information sharing and cooperation was emphasized.

First Nations attendees noted that 2007 was the second year that they had been unable to get their food salmon without travelling long distances to trade with coastal bands. A First Nations woman who has lived in the area for 30 years noted that many elders are dying of cancers and wondered if pulp mill pollution might be causing disease in the fish and those who rely on them for sustenance. Attendees said that if salmon can't return to their spawning beds, it will be impossible to rebuild runs without re-seeding with hatchery fish. A need for more funding for restoration and hatcheries, and opportunity for a greater First Nations role in enhancement were also noted.

WILLIAMS LAKE

"Our creek is a microcosm of 100 other creeks in this system," noted a participant in the Williams Lake meeting. The issues include dying pine forests, extensive logging, competition from other interests, and human impacts from construction of roads, bridges and so on. Salmon must contend with four or five issues, and addressing this will require nothing less than a major coordinated effort. DFO staff members are doing a good job, but are hampered by chronic understaffing and under funding. "We know how to do long-term planning," another participant commented, "yet it's not being done."

Despite many challenges, participants also noted positive issues, such as a city project to upgrade storm drains in Williams Lake, a collaboration to protect endangered coho with the Cuisson Creek fishway, restoration work in Horsefly, the Likely research hatchery run by UNBC, the Cariboo Chilcotin water conservation program and the strong local environmentalist community. Another positive development was the creation of a roundtable process to work on a watershed-based fish sustainability plan.

Concerns about water management and the *Water Act* predominated. The spring freshet smells like manure and agricultural run-off is causing the nutrification of Williams Lake; changes are needed regarding water licensing and fencing is needed to protect salmon habitat in rivers and creeks. One participant said Provincial authorities are reluctant to respond to violations of the *Water Act* unless a complaint is filed. But in small communities, filing a complaint can poison relationships and reduce the ability to work together. It should be up to the DFO to investigate but "they don't want to touch this," said a participant, and political considerations make it difficult for water commissioners to do so.

Impacts from the mountain pine beetle and other bark beetles were a key concern. One speaker noted expanding outbreaks of other bark beetles attacking spruce and other tree species that predominate in the wetter watersheds east of the Fraser. These eastern watersheds are home to many key salmon populations and the infestations could result in more extreme hydrological impacts, thus also posing a significant threat to salmon. On the other hand, he noted, these outbreaks have been less explosive, so there is more opportunity to take action to intervene. Another participant commented that beetle salvage operations are resulting in clear-cutting throughout the Horsefly watershed; this is increasing sedimentation and contributing to beaver activity, and restoration work can't keep up. On the positive side, one participant noted efforts to encourage forest managers to retain more standing trees and woody debris along small headwater streams to maintain nutrients and temperature regimes.

There were also many comments about mining impacts (withdrawal of water and effluent), and approval processes for new mining projects and mine expansions. Participants said fish habitat is being impacted by roads, agriculture, forestry, mining, and the construction of rural subdivisions. Low water levels, increased temperatures and siltation are impeding fish passage. Many small creeks have become disconnected from the river due to flashier spring run-off. There is also concern about the impacts of a proposed flow-of-river generation project in the Klinaklini and the Kemano Dam in the Upper Fraser.

Concerns were voiced about Chilcotin steelhead being intercepted by mixed stock fisheries on the coast. Also noted were poor adult returns in recent years, and observations of sockeye with lesions that are dying before spawning. It was suggested that DFO's in-season management of marine and downstream fisheries must become more risk averse. One suggestion was a "stumpage fee" for ocean fisheries to fund fisheries enhancement in the interior.

Finally, a concern was raised regarding the introduction of small mouth bass to Beaver Creek five to six years ago. They are expected to escape into the Quesnel and mid-Fraser soon, with potential for dramatic effect on salmon stocks. Education was stressed in order to secure public support to contain them.

3.2 IMPORTANT ISSUES RELATING TO WILD SALMON POPULATIONS

Issues of importance that participants reported as affecting or potentially affecting regional wild salmon populations can be summarized under the following key themes:

- **Stock status:** There was considerable concern about declining returns of sockeye and chinook stocks. Examples noted included the Bowron, Quesnel, Stellako, Nadina and Nechako Rivers, Early Stuart and Late Stuarts.
- **Management:** Participants felt that DFO's management of fisheries should become more risk averse to allow more fish upriver. It was felt that all levels of government lacked the capacity and sometimes the will to respond to the many threats facing salmon in the Upper and Mid Fraser, and that governments were abdicating their responsibility to protect public resources. Participants cited a need for improved communication and cooperation between ministries and departments at local, provincial and federal levels responsible for fisheries, forestry, mining, agriculture, urban development and so on. Changing rules and shifting priorities also destabilize funding and hamper volunteer efforts.
- **Legislation:** There were concerns that the *Water Act* in particular is outdated and needs to be rewritten to deal with current realities. Stronger riparian protection is also needed (ranching, placer mining). Participants also saw inadequate or inappropriate enforcement of existing legislation and policy (e.g. enforcement of forestry practices or the requirement that residents of small communities file complaints against neighbours, which can poison working relationships).
- **Water management:** This was a key theme that overlapped many others: legislation, enforcement, management, impacts from other sectors, education and awareness, etc. A key concern was the lack of any provision under the "archaic" *Water Act* to reserve water to meet the needs of fish. These concerns are exacerbated by growing competition for water and hydrological changes that threaten salmon. In light of climate change, it is a concern that no attempt is being made to change the archaic water licensing system, one participant observed. Another explained that many small creeks become disconnected from the river when hanging cliffs develop, because the freshet is not permitted to carve its way down every spring due to archaic water controls.
- **Agriculture:** There were repeated requests to "get the cows out of the water," and a sense that Provincial legislation and policy favours farms and ranches over fish. In some areas, ranchers are restricting access, attendees complained. Other ranchers are trying to restore riparian zones, it was noted, but this can be complex and costly, and government offers no support.
- **Forestry:** Logging impacts were of particular concern, particularly with respect to the mountain pine beetle. In addition to the beetle's direct impacts on forests, clear-cutting, logging roads and inadequate riparian protection are seen as significant factors endangering habitat by increasing run-off and changing stream hydrology. Other pests east of the Fraser have potential to cause as much devastation as the mountain pine beetle, it was suggested, although they are slower to spread. Poor replanting practices and inadequate support for restoration was another concern.
- **Development:** Concerns included water pollution from existing mines, proposals for mine expansion or for new mines, and lack of work on reclaiming old mines. In addition, water pollution from pulp mills and zinc oxide leaching from galvanized steel culverts are of concern, as is the new container port in Prince Rupert. Frustration was expressed regarding a perceived lack of awareness among some municipal authorities and developers about sustainable development and accommodating the needs of salmon.

- **Socioeconomic impacts:** In Prince George and Quesnel, it was noted that First Nations have not been able to meet their food fishery requirements. The economic value of the sport fishery was also stressed, with recreational fishing interests noting that international conservation organizations are concerned about what is happening and want to help.
- **Downstream impacts:** A number of participants expressed a need to better understand what is happening at sea in terms of ocean productivity, climate change impacts and ecosystem links. There were also concerns about marine and downstream fisheries impacts on depressed stocks, and a sense that more conservative management is needed in the current context. Concerns included both mixed stock commercial fisheries and recreational fisheries, especially lodges on the coast.
- **Cumulative impacts:** Participants expressed concern that management and decision-making frameworks are not considering cumulative impacts of multiple stressors on fish habitat and stocks.
- **Enhancement:** Participants said productive upstream habitat is not being utilized and there were suggestions that it might be necessary to re-seed depressed runs with hatchery fish to bring them back. Lack of funding for hatcheries and lack of support for volunteer restoration efforts were also noted, along with a potential role for First Nations in enhancement.
- **Exotic species:** The introduction of small mouth bass is threatening salmon stocks in Baker Creek and Beaver Creek, and there is concern about the bass expanding into the Fraser over the next few years.
- **Fish farming:** Concern was expressed about continued proposals for open-pen farming, particularly at the mouth of the Skeena. It was asked why there is not more of a push for closed-containment fish farms.

3.3 LOCAL SOLUTIONS

The council also heard examples of success. Participants at Williams Lake were particularly forthcoming about positive developments and opportunities. Examples included:

- A $5 million city project to upgrade Williams Lake storm drains.
- Cooperation between a mine, DFO and others to protect endangered coho in the Cuisson Creek fishway.
- A recent open house at the Likely hatchery, which is part of UNBC's research facilities, which allowed them to share their world-class work with the community.
- Improvement of the Horsefly spawning channel and ongoing restoration in the wake of clear cutting of forests killed by the mountain pine beetle.
- Cariboo Chilcotin water conservation program, supported by Environment Canada.
- The strong environmentalist community in Williams Lake.
- A roundtable created to work on a watershed-based fish sustainability plan.
- Riparian restoration on the Black Creek Ranch property.
- Positive developments in several creeks, such as Cuissan, including good cooperation from ranchers.
- Efforts to encourage forest managers to retain more standing trees and woody debris along small headwater streams to maintain nutrients and temperature regimes.
- A sport fishing lodge's unique approach in having First Nations smoke and package salmon, reducing the pressure on anglers to kill so many fish and creating economic opportunities for First Nations.

In addition, several suggestions were made regarding future opportunities:

- In Williams Lake, participants queried whether the previous steelhead fry-rearing project from Alexis Creek should be undertaken again and/or whether another such project should be attempted at the Hanceville hatchery.
- In response to concerns about lower water levels and elevated temperatures in the Horsefly River, a participant suggested that water from McKinley Lake be used to cool downstream flows.
- A Williams Lake participant noted that he has "an idea and design for an affordable, movable salmon fry ladder."
- In Quesnel, participants suggested that a salmon-river interpretation centre might present a "huge" opportunity.
- In Quesnel, the Mayor also stressed the value of awareness and education in creating a better appreciation of the needs and importance of wild salmon.

4. CONCLUDING REMARKS

The PFRCC has benefited from listening to comments and perspectives on local salmon issues during our meetings. The Council appreciates the passion and ideas that communities have shared and the issues we face in maintaining healthy salmon stocks and habitats. The PFRCC will continue this discussion with other communities across BC in support of healthy salmon populations and high quality habitat, and will share the information obtained with federal and provincial fisheries ministers and with the public.

APPENDIX 1: MAPPING COMMENTS FROM PRINCE GEORGE, QUESNEL AND WILLIAMS LAKE

Background: Participants were invited during each meeting to record specific examples of local issues, challenges and opportunities directly on the large table maps provided. There was significant overlap between geographic areas covered at each meeting, so all the comments and notations were compiled and broken down into five geographic regions, as represented on the following maps (Maps 1 to 5). Participant comments from the maps were transcribed verbatim and listed in the accompanying tables below (Tables 1 to 5). The number beside each comment in the tables cross-references the comment to the relevant location recorded on the accompanying map.

Comments provided by participants during the mapping exercise ranged from the general (location of a local sport fishery) to very site-specific examples that illustrate and reinforce key themes and concerns discussed at the community meetings. Many of the comments emphasize concerns relating to local habitat or salmon stock status, as identified by the participants. An example is Comment #3 on Map #1, indicating where a small local creek (Kersley Creek, near Quesnel) dries up every year, leaving hundreds of salmon fry in pools that dry up.

Maps by Kris Moulton and Mark Johannes.

SUMMARY OF COMMENTS AND COMMENT LOCATIONS ON MAPS 1-5

TABLE 1. MID AND UPPER FRASER MAP 1

Map #	Public Comments
1	Extreme water levels due to climate variation
2	Pulp mills—dioxin in sediment
3	Kersley Creek—dries up every year leaving hundreds of salmon fry in pools that dry up
4	Pollutants in water
5	Cuisson Creek—BC rail barriers need to be removed. Confirmed chinook / coho.
6	Quesnel River—depleted sockeye runs / stocks
7	Mine runoff
8	Beaver Creek—potential for smallmouth bass to spread into Quesnel River and Fraser River to compete with salmon
9	Hazeltine Creek—Mt Polley mining discharge
10	Sport fishery
11	Jet boats
12	Poor McKinley returns
13	Moffat Creek—extensive clear cutting and road building for industry logging
14	Accelerated mining, Borland Creek increased temperature, sediment, loss of habitat
15	Inconsistent water flow—extreme temperature variations, obstructions need to be cleared to enhance spawning habitat (Hawkes Creek)
16	Urban runoff
17	Williams Lake drinking water aquifer is going down
18	Sewage into Fraser River and storm drains, increased metals and solids
19	Buckskin Creek—runs dry daily in spring / summer as water users irrigate
20	Mackin Creek—fluctuations in temperature and flow due to flood irrigation—no monitoring of water license compliance, watershed full of pine-dead or dying
21	Cottonwood River—poor range land practices, no fencing of cattle from streams
22	Baker Creek—extreme water level fluctuations due to climate variation
23	Barlow Creek—filled in by land owner
24	San Jose Watershed—very low water flows from agriculture withdrawals and erosion from logging

Map #	Public Comments
25	Upper Horsefly River—spruce bark beetle kills
26	Quesnel Area—loss of riparian areas from placer mining
27	Horsefly Watershed—extensive clear-cutting

MAP 1. Summary of comments heard by the PFRCC for the Mid and Upper Fraser.

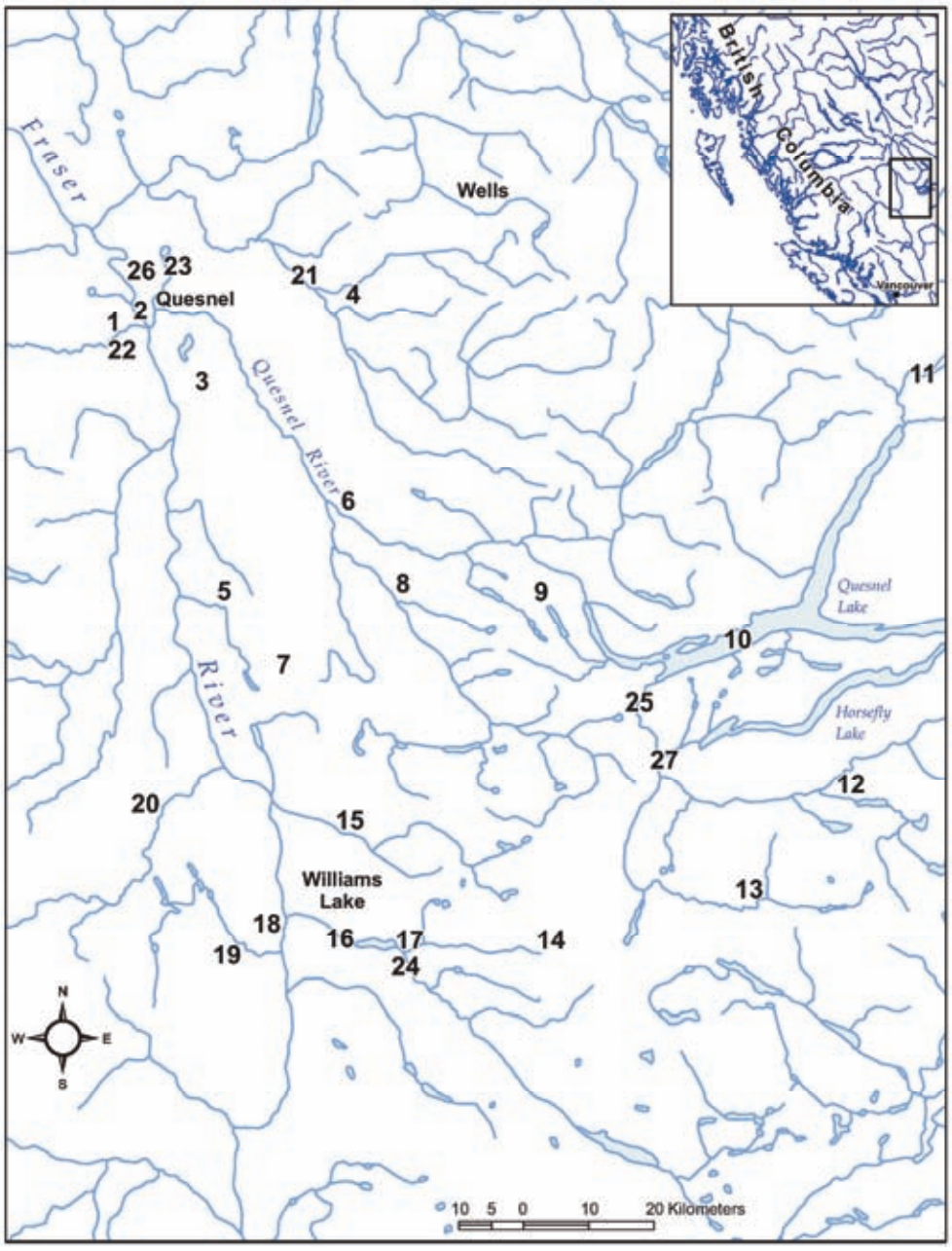


TABLE 2. MID AND UPPER FRASER MAP 2

Map #	Public Comments
1	Fraser River pulp mills at Prince George—water usage problems
2	Spring salmon fishery in Bowron / McGregor should not be allowed including Torpy River
3	Bad urban planning destroying habitat, heavy metals from industry
4	Bowron River—low returning chinook stocks observed over past 5 years—chinook fishing should be closed
5	Prince George—poor urban planning destroying habitats

MAP 2. Summary of comments heard by the PFRCC for the Mid and Upper Fraser.

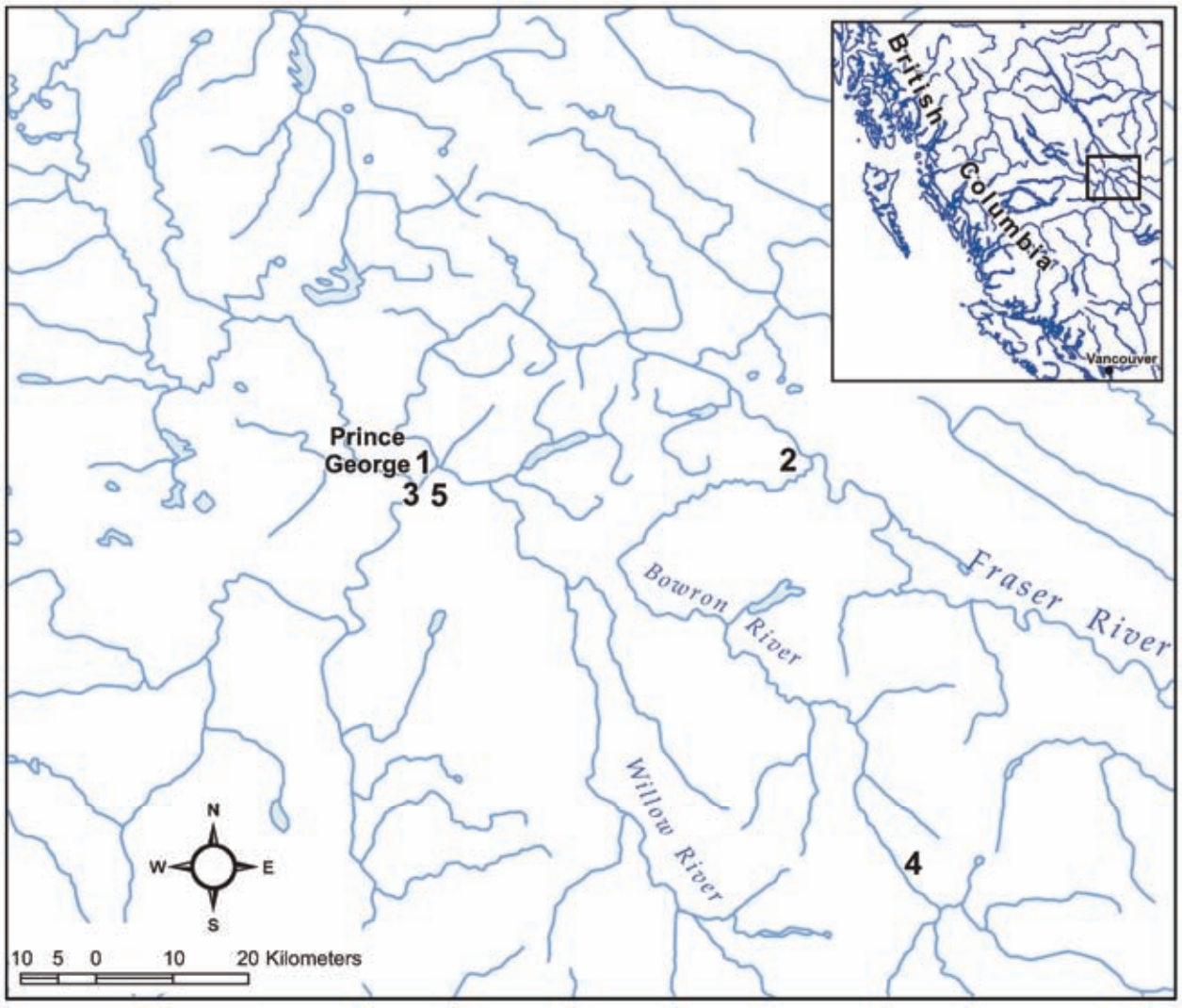


TABLE 3. MID AND UPPER FRASER MAP 3

Map #	Public Comments
1	Underfunded/poorly controlled habitat / forestry management
2	Stellako River
3	Nechako River—depleted sockeye runs / stocks
4	Expanded transportation corridors risking habitat / new container cargo port
5	Runoff management of Ootsa

MAP 3. Summary of comments heard by the PFRCC for the Mid and Upper Fraser.

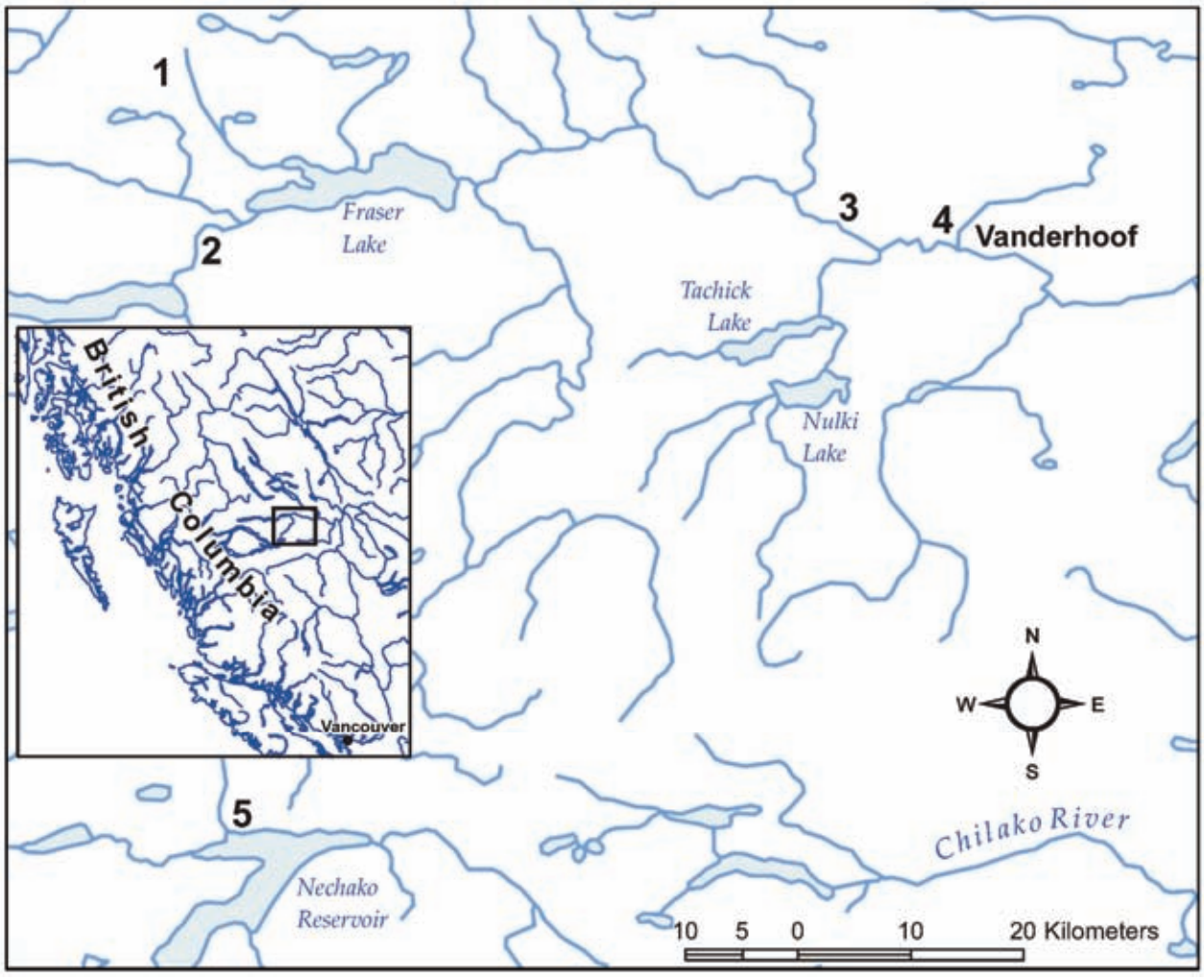


TABLE 4. MID AND UPPER FRASER MAP 4

Map #	Public Comments
1	Driftwood River early Stuart run—very low returns this year
2	Poor road building—siltation of streams
3	Nadina River—low escarpment
4	Nadina River spawning channel underutilized

MAP 4. Summary of comments heard by the PFRCC for the Mid and Upper Fraser.

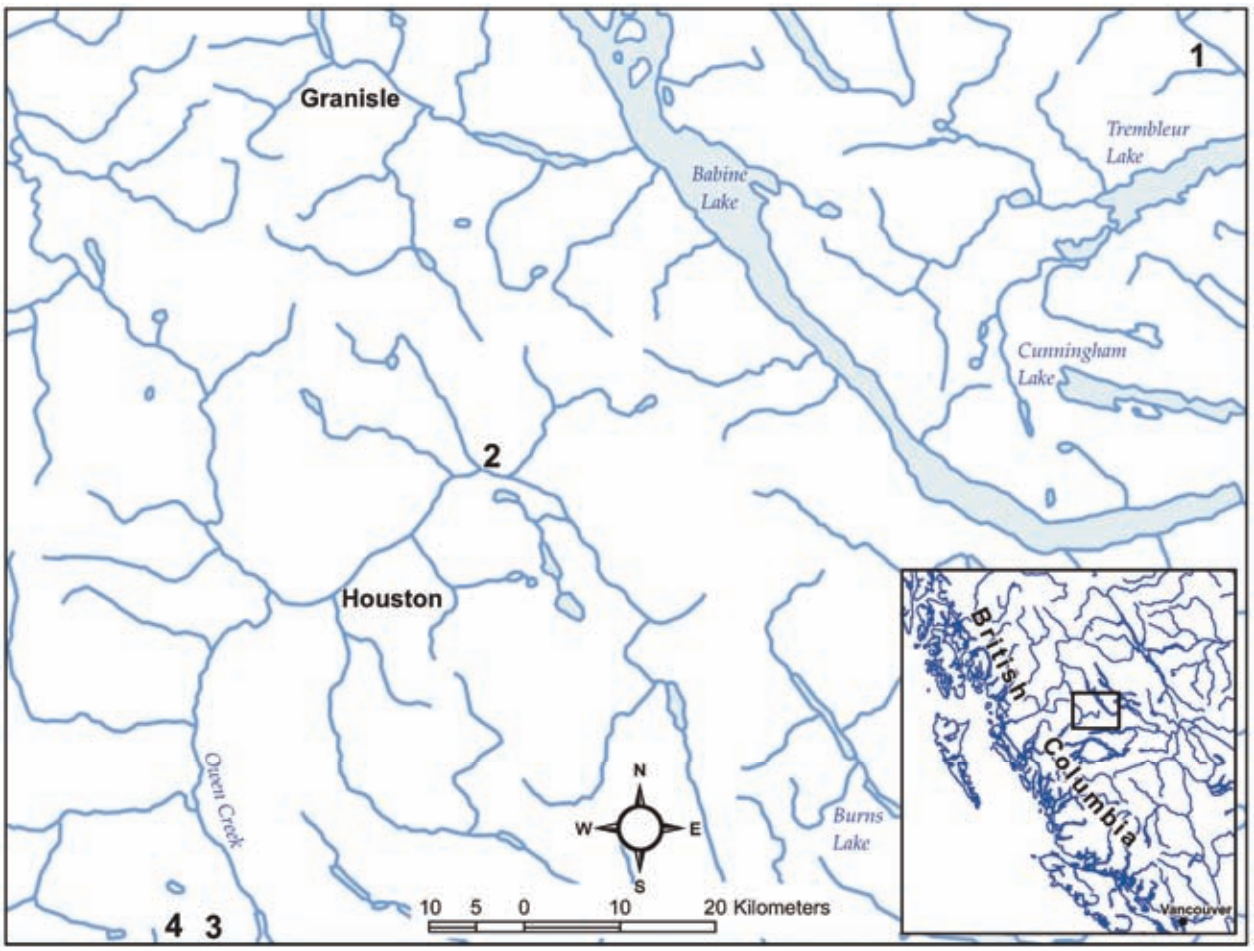
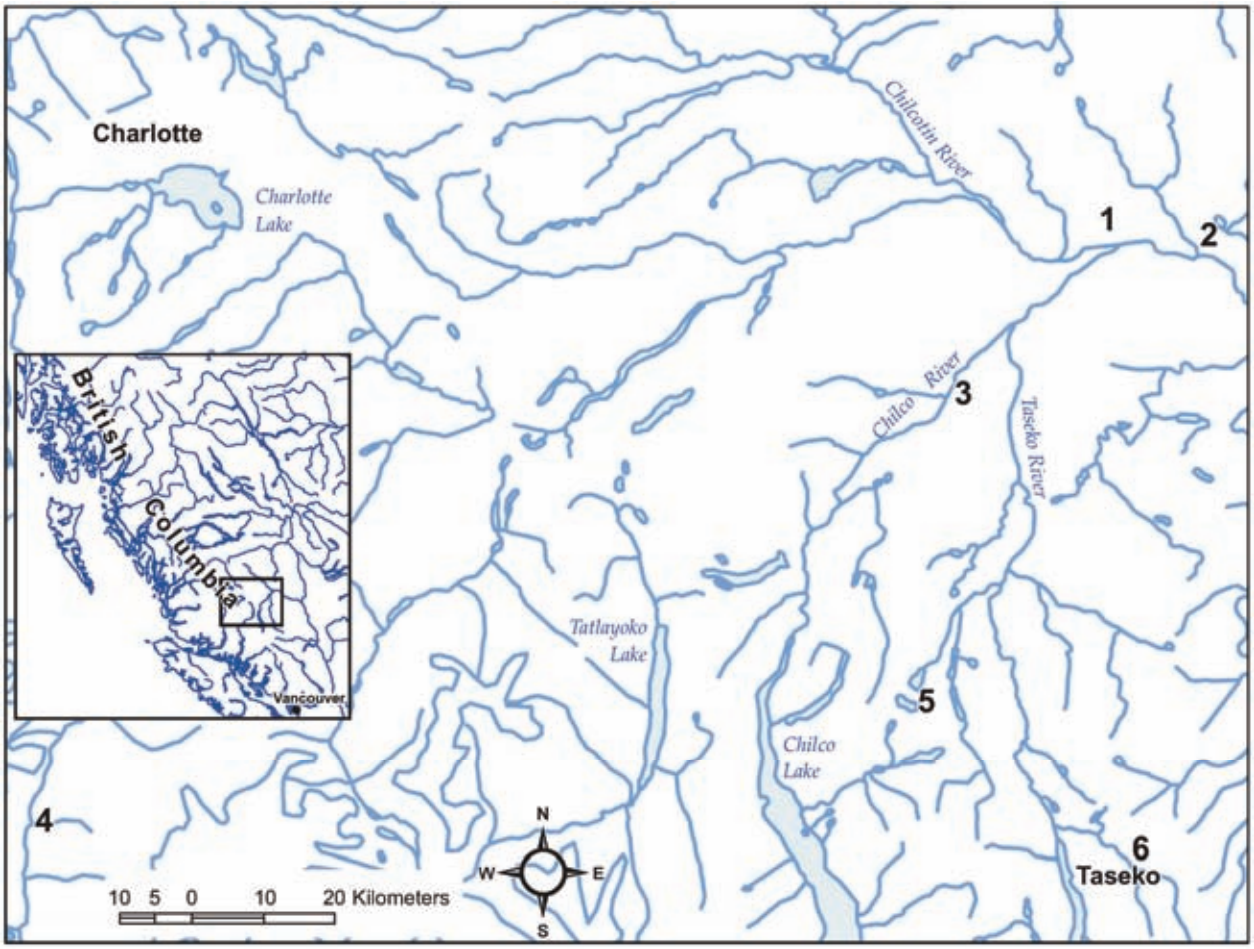


TABLE 5. MID AND UPPER FRASER MAP 5

Map #	Public Comments
1	Chilcotin steelhead—intercepted by mixed stock commercial fisheries in lower Fraser River / coast
2	25% drop in salmon on Chilcotin
3	Poor chinook returns
4	Proposed Klinaklini power project
5	Large flood 3 years ago on streams that run between Taseko and Chilco
6	Fish Lake—proposed mine

MAP 5. Summary of comments heard by the PFRCC for the Mid and Upper Fraser.



290 – 858 Beatty Street
Vancouver, British Columbia
Canada V6B 1C1
Telephone: (604) 775 – 5621
Facsimile: (604) 775 – 5622
E-mail: info@fish.bc.ca
www.fish.bc.ca