PACIFIC FISHERIES RESOURCE CONSERVATION COUNCIL
Conseil pour la conservation des ressources halieutiques du pacifique

PRIORITIES AND STRATEGIES FOR CANADA'S WILD PACIFIC SALMON AND STEELHEAD

Advisory Report of the Pacific Fisheries Resource Conservation Council

JANUARY 2010

Pacific Fisheries Resource Conservation Council
Suite 290, 858 Beatty Street, Vancouver, BC V6B 1C1

Priorities and Strategies for Canada's Wild Pacific Salmon and Steelhead
Advisory Report of the Pacific Fisheries Resource Conservation Council

For quotes and short excerpts from the material covered under "fair use", we recommend the following citation:
PFRCC. 2010. Priorities and Strategies for Canada's Wild Pacific Salmon and Steelhead. Advisory Report of the Pacific Fisheries Resource Conservation Council. 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 11-897110-63-4

Cover photo credit: Fred Seiler

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Over a period of eleven years the Pacific Fisheries Resource Conservation Council has provided public information and offered strategic advice to ministers responsible for protecting and sustaining wild salmon and steelhead stocks and habitats. This report summarizes many of the key findings and recommendations contained in the 69 background papers, advisories and other Council publications. It presents the Council's recommendations to ministers on the most significant current issues, and it outlines the strategies that should drive government decisions towards achieving more effective salmon conservation.

Conditions such as climate change, population growth and competition for water access are among the most significant factors undermining salmonid populations. The downward trends in salmon productivity in many of British Columbia's once-abundant salmon areas have become even more severe in the past decade. The province's salmon stocks are at nearly one-third of their historic abundance. The convening of a judicial inquiry into the drastic declines in Fraser River sockeye illustrates the extent of public apprehension and the level of confusion about the causes and contributing factors.

The Council's reports have included several scientific and technical reports in addition to those dealing with policy-level issues and matters related to the management of salmon and steelhead. This report draws from all of those reports to present summaries and compilations of the several themes, findings and recommendations.

The Council has been disappointed by the inability or reluctance of governments to apply the precautionary approach in ways that assigned tangible value to environmental protection in many of their regulatory and development decisions that ultimately permit the undermining of salmon and steelhead populations. Also of concern has been the tendency for governments to be reactive to crisis conditions, rather than being proactive in what have often been predictable and preventable situations or initiating habitat ecosystem protection for vulnerable and high-productivity areas.

Salmon and steelhead management predictions and decisions have been hindered by persistent reductions in the collection of stock status information through assessment processes. The resulting information gaps have been widened even further by the lack of analysis of much of the collected data, as fisheries department budget reductions have choked off the resources previously assigned to this important function.

There are public misconceptions about the problems of salmon and steelhead, including the claim that fishing and excessive catch levels are primarily to blame. The readiness to merely assign blame, rather than recognize the deep-seated and complex factors, has led to the continuation of many government policies and management practices that undermine the long-term sustainability of stocks and too often fail to address the real problems.

The Council's view is that the coming decade will see wild Pacific salmon in far greater jeopardy than at any previous time. Among the primary assumptions, the Council members pointed out that it would be unrealistic to expect salmon habitat to be restored to pristine conditions, but that British Columbians have not come to grips with setting realistic expectations about how much more of the salmon resource they are willing to sacrifice in the face of conflicting environmental and economic objectives.

The Council set out strategic advice for specific action on five priority issues. The first proposes a new science and research agenda that would focus on emerging issues and practical conservation applications. The second calls for the transition to an ecosystem-management approach that would integrate the contribution of various scientific disciplines and introduce alternative perspectives. The third proposal is for the two levels of

government to carry out a joint review that would lead to more credible, seamless and rigorous application of the laws and regulations meant to protect salmon and steelhead populations.

The Council's fourth priority proposal was to support innovative projects, such as the North American Salmon Stronghold Partnership, that would reinforce the most crucial areas of salmon abundance that cannot afford to be undermined or lost. The final recommendation is for the ministers of both governments responsible for salmon and steelhead to establish funding for a comprehensive salmon sustainability strategy.

1. THEMES AND OBJECTIVES

Throughout the past eleven years the Pacific Fisheries Resource Conservation Council has produced an array of background reports, technical documents and policy positions under its mandate to provide information and advice to federal and provincial government ministers. These reports have dealt with a wide range of matters relevant to the protection and restoration of wild Pacific salmon and steelhead across British Columbia.

At various times, the Council has dealt with high-level policy issues and provided advice on many topics for senior decision-making levels of governments. At other times, the Council has focused on scientific issues that were meant to fill gaps in knowledge about salmon stocks and habitat and to address questions of a technical nature. In its assigned role of informing the British Columbia public about the state of salmon stocks and habitat, the Council has attempted to make its reports as relevant and understandable as possible to readers at all levels of comprehension.

This report draws together the threads of ideas and findings contained in the various Council publications, currently totaling 69 reports and brochures; they are all listed in this report's appendices. It summarizes the Council's views in a compilation of themes and subjects. Rather than put forward a review of each publication, this report provides a synthesis of the findings, perspectives and advice within each policy and issue category.

This report also provides the Council's perspectives on some important themes that frame the discussions about Pacific salmon and steelhead conservation, mainly concerning the new ways in which the emerging and future challenges facing Pacific salmonids need to be addressed.

Finally, this report presents five recommendations that, together, should constitute the basis for an underlying strategy to advance Pacific salmon and steelhead conservation. These are presented in a brief and to-the-point format of salient background information and specific action items.

1.1 CONCEPTS AND LEARNING

This report presents a prioritization of conservation issues and policy advice. In many respects it also explains what the Council has learned and how its positions have evolved over more than a decade of investigation and analysis. Nevertheless, the current positions of the Council have remained largely consistent throughout time with the advice and views expressed in previous Council reports.

The Pacific Fisheries Resource Conservation Council was established in an era that experienced a series of fisheries crises and stock crashes, particularly of coho, sockeye and steelhead populations in several regions within British Columbia. The notion of establishing a ministerial advisory organization came about as a key recommendation of the 1995 public review report on the disappearance of millions of Fraser River sockeye; this was an event remarkably similar to the current situation that just led to the establishment of a judicial inquiry. Consequently, the Council's initial agenda and focus on issues in 1998 reflected the particular challenges that needed to be addressed by the government fisheries agencies on a priority basis at that time.

The Council's purpose in preparing this report is to suggest to ministerial-level decision-makers the priorities and conservation components of a strategy for the Government of Canada and Province of British Columbia to fulfill their constitutional and international obligations to ensure the viability and sustainability of Canada's Pacific salmon and steelhead. At the same time, the Council acknowledges that the sustainability of salmon and steelhead will also depend upon the cooperative and collaborative actions by many stakeholders, including regional and municipal governments, First Nations governance bodies, fish harvesters, and stewardship and advocacy volunteers.

Where this report comments on the Council's technical publications, it presents the findings in terms of their relevance to ministerial and senior management policy-making and decisions, rather than their interest to researchers, biologists or other specialists involved in Pacific salmon and steelhead. The technical reports, particularly on ground-breaking habitat indicators, were meant at the time to advance knowledge and fill research gaps rather than provide an immediate basis for the Council to offer policy advice or recommendations. While many of the Council's reports have directed their analysis and subject-matter to technical specialists, this report's explanations of those publications and their relevant messages are interpreted, to the extent possible, in relation to informing ministerial decisions.

The Council's past publications continue to be valuable reference documents, serving as sources of insights and useful perspectives. This report is not meant to replace the many other Council reports from which it draws information, inspiration and ideas. The Council's reports are valuable and informative in their own right, and they deserve to be reviewed and given continued attention.

The need for effective and immediate action by the governments of Canada and British Columbia to fulfill their salmon conservation obligations has never been more important. Much of British Columbia's salmon and steelhead resource is under severe duress. A recent study showed the province's salmon stocks are at nearly one-third of their historic abundance. Some of the recent sockeye returns on the Fraser River have been at their lowest in thirty years. Coho stocks from the interior of the Fraser River watershed remain at all-time lows.

1.2 COUNCIL'S REFERENCE POINTS

When the Pacific Fisheries Resource Conservation Council was formed in 1998, the members immediately began to define the standards and benchmarks needed for the consideration of the state of Pacific salmon stocks and steelhead and their habitats. That selection of recognized criteria was meant to ensure that there would be a valid and measurable basis for the Council to evaluate trends and consider how conservation measures should be applied.

At the same time, the Council focused on the importance of governments fulfilling their legislated mandates and associated regulatory obligations to protect wild Pacific salmon and steelhead. The Council also adopted the criteria of various national and international legislation, conventions and agreements to which Canada committed to adhere. These high-level obligations related to the conservation of salmon and steelhead include:

- *The Fisheries Act*: This legislation spells out the responsibilities of Fisheries and Oceans Canada and other federal agencies and defines the responsibilities of the Government of Canada in its jurisdiction to provide for *"…the conservation of fish and waters frequented by fish"*.
- *The British Columbia Fisheries Act*: This provincial legislation, which integrates with the *British Columbia Water Act*, defines the Province's jurisdiction related to steelhead, salmon and other fish species and deals with the impacts of activities primarily affecting fish habitat.
- *The United Nations' 1992 Convention of Biological Diversity*: In this international agreement Canada is committed to conservation, sustainable resource use and equitable sharing of natural biological-resource benefits and the *"…ecological, genetic, social, economic, educational, cultural and esthetic values of biological diversity and its components."*
- *The United Nations Code of Conduct for Responsible Fisheries*: By adopting this Code, Canada agreed to acknowledge the significance of risk-averse fisheries management and a precautionary approach, and pursue its regulatory obligations from the position that the *"…absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation or management measures."*

In referencing these policy statements, legislated obligations and international commitments, the Council members considered it crucial to measure the ways in which they were being applied in fisheries policy, regulation and management, by stating three standards:

1. The Council will hold governments to conduct themselves, and regulate private activity, in a manner consistent with the conservation and protection of ecological integrity and biological diversity as it relates to the conservation of fish and the protection of fish habitat.
2. As a general rule, the Council will rely upon the United Nations Convention on Biological Diversity, as well as the Code of Conduct for Responsible Fisheries, when considering matters related to fish conservation as well as habitat protection.
3. The Council will endeavor to ensure that within both federal and provincial jurisdiction, governments conform to the precautionary principle and risk-averse practices for fish conservation and habitat protection.

The Council established its points of reference from the perspective that it was necessary to address natural and human-induced impacts of all kinds that jeopardize the health and prospects of wild Pacific salmon and steelhead. The Council members were determined to apply these specific and quantifiable reference points to monitor success or failure in meeting salmon and steelhead conservation objectives.

1.3 PRECAUTIONARY APPROACH'S GUIDANCE

The notion underlying the precautionary approach is simple, but its translation from theory to application by fisheries managers can range from a simple admonition (be-careful-out-there) to a rigorous evidence-based assessment of all environmental factors, human activities and management decisions affecting Pacific salmon and steelhead ecosystems.

Considerable efforts have been made by government agencies to provide counsel and best-practice examples for public servants in the application of the precautionary approach in their work. Still, the difficulty has persisted in how to use the precautionary approach for many public sector decisions related to salmon and steelhead. For example, many of the vigorous debates about net-pen salmon aquaculture in British Columbia have revolved around the lack of absolute "proof" about the possible negative impacts of sea lice concentrations near salmon-farm sites on the survival of migrating wild salmon juveniles, and the potential for parasites to infect the wild fish. While some argued that the precautionary approach would call for the removal of net-pens from migration routes, others have claimed that a specified threshold of evidence and identification of direct causal links was necessary to justify any application of the precautionary approach.

Similar cases exist for other human activities such as logging, dredging, mining, construction and agricultural development that can have significant economic benefits, but bring with them an array of direct and indirect environmental consequences, many of which become evident only after long periods of time.

Adherence to the precautionary approach, as it relates to activities and decisions affecting Pacific salmon and steelhead, has been particularly difficult when the state of these fish stocks can be affected by a combination of factors. In many instances, the aspects of risk and uncertainty that are meant to be addressed by using the precautionary approach have not been adequately informed by science, due to the limited extent to which research can contribute definitive information for risk evaluations. They tend to ignore the cumulative effects of the array of industrial, agricultural, forestry, road-building, and other impacts that together undermine salmon

and steelhead habitat. While the use of the precautionary approach may have strong conceptual support, it is not reinforced by Canada's legal system that calls for proof of guilt or at least a preponderance of evidence.

The Council's experience of the past decade has shown that there is limited scope to apply the precautionary approach, except to the extent that it can be used by conservation advocates to counterbalance arguments that favor the primacy of economic values and persistent pressures for development and resource-use activities.

1.4 SALMON BIODIVERSITY OBJECTIVE

The health and status of Pacific salmon stocks cannot be accurately measured simply by their abundance trends in streams nor on the basis of total returns for a given population in any particular year. The aggregated numbers in many cases mask the reality of contrasting status of the vastly different wild salmon and steelhead stocks and their distributions within systems in British Columbia and across the north Pacific.

Salmon and steelhead in North America comprise six species—chinook, coho, sockeye, pink, chum and anadromous rainbow trout—but the biological diversity is far more complex than this representation. Within any one of these six species there is a complex array of life-history variability and evolutionary-based genetic adaptations to a broad tapestry of habitat conditions. For Pacific Canada, there are an estimated 9,662 salmon stocks in British Columbia and Yukon, each with its own unique genetic traits. Since the 1970s, thousands of different salmon populations and sub-populations in British Columbia have been identified by fisheries scientists as being genetically or spatially distinct with, almost certainly, local adaptations occurring within these groups. Despite the desire by the public and fisheries agencies to protect salmon and steelhead stocks, an estimated 142 of them became extinct and 624 more were at high risk of extirpation by the end of the twentieth century.

The recent controversies about the poor overall returns of Fraser River sockeye, for example, have failed to acknowledge the potential for severe impacts on some of the smaller salmon populations in areas that were previously abundant. The decline of Fraser River sockeye to an historically low million-and-a-half potential spawners for the 2009 cycle year may result in dramatic declines or extinctions in a number of genetically distinct populations. However, it may be several years or even decades before the effect of this year's poor sockeye returns will be fully evident or measurable in various areas of the Fraser River watershed.

The 1998–99 PFRCC Annual Report explained:

> *"As this Council has noted, there is a staggering diversity in salmon populations …This diversity is crucial from a resource production perspective …salmon fisheries must be managed from the premise that local spawning populations reflect genetic diversity that is valuable to the long-term maintenance of the salmon resource."*

It was with this biodiversity protection priority in mind that the Council became an enthusiastic supporter of the concepts that served to underpin the introduction and implementation of the Wild Salmon Policy that has been a primary salmon biodiversity initiative of Fisheries and Oceans Canada for the past decade.

The need to protect salmon biodiversity led to the Council looking beyond conventional abundance trends, to consider ecosystem protection on the scale afforded only by initiatives such as the North American Salmon Strongholds Partnership and similar collaborative work to ensure that crucial spawning and rearing areas are not put at risk. The North American Salmon Strongholds Partnership and Heart of the Fraser initiatives, for example, involve identifying the attributes of critical high-abundance areas that need to be assigned protection and careful management. The assignment of priority attention to protect the most crucial salmon habitat areas is an essential complement to the Wild Salmon Policy's identification of stocks at risk.

1.5 NATURE OF THE COUNCIL'S ADVICE

The Pacific Fisheries Resource Conservation Council was created to examine wild salmon and steelhead issues for the purpose of providing information and advice to ministers. In that role, it was to present an informed, unbiased and authoritative perspective to help guide government decisions and assist government agencies to carry out their conservation responsibilities effectively.

The Council was never intended to be an advocacy group or lobbyist for particular interests and philosophies. It was to be composed of informed individuals, working together to establish consensus positions and act in the public interest. The Council members in the organization's formative stages resolved to serve as a voice of moderation about Pacific salmon matters that were all-too-frequently confrontational and unproductive. The Council sought to help refocus the public debate about Pacific salmon conservation towards frank but respectful dialogue and to offer constructive criticism where it was warranted.

The Council opted to focus on specific conservation issues, such as salmon aquaculture, knowing that these topics defied easy solutions. On some issues, such as climate change, the Council was at the leading edge of research and policy positions at times when the science community and other groups were overlooking its significance for salmon and steelhead. The analysis and recommendations of the Council were often not immediately embraced in salmon assessment and forecasting, but they catalyzed further analysis and eventual adoption of at least some measures to account for climate change assumptions.

Various opinions have been offered about the success or failure of the Pacific Fisheries Resource Conservation Council to influence government decisions or to affect the status of Pacific salmon and steelhead. The overall value of the Council has been questioned at times by some stakeholders who pointed out that most of the problems that the Council was created to address continue to exist, and some conditions appear to have worsened over the past decade.

Others have suggested that the Council should have been more hard-hitting and demanding in its advice to ministers. The Council members, however, have maintained the view that it was more important to provide workable solutions than to stake out policy positions that had little likelihood of acceptance. The approach of the Council has been to present its information and advice with as much frankness and clarity as possible, but also with recognition of the limited tools, budgets and resources available to government officials to respond rapidly to unexpected situations and significant changes.

Over the years, the Council offered many recommendations, only some of which appear to have been adopted or implemented. In some cases, the advice was in broad directional terms, and it is difficult to say whether it was accepted or ignored. In other cases, the advice was specific, and elicited responses that either adopted the proposed action or led to alternative solutions. In other instances, the Council's advice appears to have been ignored because it was inconsistent with current policies and political agendas. At times, the advice was overlooked because it was not scientifically unequivocal or could have been costly to implement.

Advisory groups in other fields may have better track records in terms of government acceptance of their advice, but in many instances they delivered only conventional wisdom and easy-win solutions rather than tackling the really difficult topics. The Council often chose to address complex and intractable matters, including hatchery impacts, with a clear understanding of the challenges involved in helping to solve the longstanding problems and controversies associated with them.

The Council learned that policymaking is a slow process in government bureaucracies, and the adoption of recommendations can involve a long lag time even for the most obvious of useful policy changes. Advice from external advisory bodies, such as the Pacific Fisheries Resource Conservation Council, cannot and should not

be expected to lead in every instance to immediate acceptance or adoption. Long lead times are often required for budget cycles, program spending commitments, multi-year projects and personnel resource assignments. Consequently, the ability of government agencies to change their policies and practices is limited, regardless of the willingness of ministers and public servants to do things differently.

In a similar vein, the Council has been criticized for adopting an overly conciliatory voice in the polarized fisheries and environmental policy debates. Proponents of this view overlook the unique role of the Council as a ministerial advisor. Unlike most environmental non-government organizations, the Council's adopted a public-interest and consensus-based perspective rather than promoting views similar to advocacy groups, lobbyists or special interests, regardless of how fervently they might represent similar conservation goals.

British Columbia's fisheries, and Pacific salmon and steelhead resources in particular, have often been the subject of exaggerated claims and dire predictions, as proponents on both sides of the salmon aquaculture debate have demonstrated. Overstatement and hyperbole have become all-too-often the typical approach in news media coverage of salmon issues and the positions taken by pro and con advocacy groups. Where severe problems have emerged, they have often been dismissed as just more of the same sort of hype. This circumstance has left the British Columbia public confused about what is happening to fish stocks, and skeptical about the distinction between fact and fiction. The Council has attempted to shed light, rather than generate heat, on the issues based on science and evidence and to offer realistic options for salmon and steelhead conservation.

2. ISSUES ADDRESSED IN REPORTS AND ADVISORIES

The Council's reports and advisories have addressed a wide range of topics, and generated findings that related in both direct and oblique ways on the status and conservation of wild Pacific salmon and steelhead.

This chapter describes the research and findings contained in publications of the Pacific Fisheries Resource Conservation Council, as well as the recommendations that have emerged at various stages of the Council's deliberations. They are summarized here in a condensed form and clustered within categories that reflect a series of primary themes, rather than separately listing reports and summarizing them. In this way, the findings and advice are presented in terms of their overall relevance for current and future decision-making.

The initial workplan of the Pacific Fisheries Resource Conservation Council pursued a balance between dealing with immediate problems and addressing long-term issues. A set of pressing salmon conservation problems at that time required analysis and solutions, and the Council was in a position to provide new perspectives and candid policy advice for ministers.

At the same time, the Council members identified the issues, such as climate change, and institutional arrangements, such as the Pacific Salmon Treaty and water legislation, that would have long-term implications for conservation and would require more deliberation. In these cases, the Council was able to sponsor innovative applied research and develop consensus positions on matters that would require significant shifts over time in resource policies and fisheries management practices.

In this report, the Council's information and advice is characterized within four categories of topics and sets of issues: stock status, freshwater habitat, ocean survival, and resource management policies. An additional category commenting on the extent of uptake and utilization of the Council's advice is also presented in this section.

2.1 STOCK STATUS ISSUES

One of the primary reasons for the establishment of the Pacific Fisheries Resource Conservation Council was to better inform the public about the status of Pacific salmon and steelhead stocks across British Columbia. The series of sudden declines and uncertainty about the long-term prospects for salmon have led to considerable public anxiety. The availability and credibility of information on the state of Pacific salmon stocks have been matters of concern to many British Columbians and the focus of several of the Council's early reports. An independent body was considered necessary to assemble what was known about Pacific salmon and present an informed opinion about conditions from a long-term stock conservation perspective.

There are extensive historical data and records for salmon in many areas of British Columbia, but relatively few in others. The information collected through harvest monitoring and various other surveys has been a valuable resource to help guide management of the fisheries. At the same time, Pacific salmon abundance changes have become unpredictable in many instances, defying even the most careful data-based forecasts and history-based theories of productivity and returns.

Over the past decade, the Council has found that there has been a general overall improvement in public information and accessibility about status of stocks and habitat. The websites of the Pacific Salmon Commission, Fisheries and Oceans Canada and the British Columbia Ministry of Environment now contain more reference material, background documents and updates on a variety of salmon and steelhead conditions. The fisheries reports of these government agencies on conditions and plans have generally become more timely

and comprehensive. An exception to this trend is the continuation of generally limited public access to relevant information about the status of steelhead stocks across much of the province, in spite of the BC Ministry of Environment's investment in technology and data gathering.

Salmon stock conditions are functions of several natural and human impacts. Scientific investigations are only gradually revealing new information about the risks of emerging situations, such as declining groundwater tables, that impact salmon and steelhead productivity, and are beginning to offer a basis for the introduction of new conservation measures to deal with them.

2.1.1 ASSESSMENT AND ENUMERATION

The management of salmon stocks by the regulatory agencies of both federal and provincial governments has relied to a great extent on the information from monitoring and assessment programs. Salmon enumeration is a costly process, and has required investment in long-term programs to allow year-by-year comparisons of salmon productivity and run sizes in rivers and streams across the province. In some instances, indicator streams have been selected to provide representative sampling of conditions and general trends. Catch and effort data are routinely used for assessment, in-season management, and forecasting purposes. Perhaps the most comprehensive of these are the test fisheries and sonic monitoring conducted by the Pacific Salmon Commission for Fraser River pink and sockeye salmon as these fish enter the approach area. Nevertheless, there continue to be many unknowns about productivity in many areas despite the resources assigned to track and assess Pacific salmon.

Several Council reports, particularly during the five-year period to 2004, focused on stock status issues in the southern and central coastal regions of British Columbia. Those reports dealt exhaustively with the ways in which trends appeared to be developing, and documented various conditions that needed to be addressed. Virtually all of those reports lamented the problem of the lack of information required to make sound, evidence-based resource management decisions. Basically, the reports cited a chronic lack of adequate salmon and steelhead enumeration and data.

Those Council reports on stock status also revealed the persistent reductions in budgets for salmon enumeration, causing substantial information gaps and greater difficulties in assessing the status of salmon stocks. Annual enumeration of several streams that had been monitored for decades was stopped. Interrupting this time-series meant that comparisons could no longer be made to determine trends in stock status. It should not be surprising that changes in stock monitoring programs and reduction of funding for enumeration have led to higher risk in management decisions that lack a basis of reliable time-series data.

Complicating the problem even further, the Council's reports explained that much of the data collected from assessment processes was not being used. Government budget reductions in many instances appear to have led to the data simply being warehoused to an increasing extent. The mining of these data could provide valuable findings and clues for improved salmon management. The same holds true for steelhead, where the Province's extensive and long-term harvest analysis is hardly utilized or parsed to inform management decisions.

At the same time, fisheries managers have introduced and updated some useful methodologies and approaches to help guide their decisions. The use of technologies, such as Geographical Information Systems, has helped to visualize geographic trends more clearly. The shift of funding to activities related to the Wild Salmon Policy is cited as the rationale for more productive use of resources. And, in some instances, governments have pointed out that there is no economic justification for continued investment in monitoring of some stocks that are no longer subject to harvest pressures.

The Council has been emphatic about the position that the management of Pacific salmon and steelhead requires better information and analysis, and the methodologies for enumeration need to be strengthened rather than allowed to deteriorate. A reinvigorated role for assessment, funded more adequately, must be pursued as an integral component of salmon and steelhead stock management.

2.1.2 APPLYING SUSTAINABILITY CRITERIA

The precautionary approach has been a mainstay of the Council's perspective on conservation issues and a basis for its positions on potential measures to protect and restore Pacific salmon. The advice of the Council on salmon enhancement and aquaculture, for example, has been driven by the importance of acting in ways that are biased towards the protection of ecosystem integrity and salmon stocks. Where choices are to be made that might put salmon stocks at risk, conservation values must predominate.

In its reports, the Council promoted the precautionary approach, realizing that the decisions of governments will take into account many factors beyond conservation objectives and criteria. While the precautionary approach calls for a low-risk or no-risk position, governments are inevitably under pressure to account for economic benefits and social objectives that, in most respects, counter the environmental objectives.

Adherence to the precautionary approach requires governments to err on the side of conservation and environmental values, and it should not be surprising that this rarely occurs or that exceptions predominate, given the pressure for economic development. While the precautionary approach describes an ideal context, it provides insufficient guidance to governments trying to accommodate conflicting objectives that pit environmental versus economic values.

The notion of sustainability—environmental protection that meets present needs without compromising future generations—more accurately describes the position taken by the Council in more recent reports and policy advice. The ability to protect and restore Pacific salmon populations, where possible, requires recognition that governments face conflicting objectives and difficult choices. The challenge for wild salmon conservation is to ensure a clear appreciation by government agencies and officials about the consequences of their decisions on the future of salmon and steelhead populations.

2.1.3 ECOSYSTEM PERSPECTIVE

The management of salmon has traditionally been on a single-species basis that emerged from the emphasis on biological and behavioral factors. This involved separate management of each species to account for their differences in life cycles, run timing, and various other distinctive aspects. Over time, salmon management regimes evolved to some extent to account for groupings of species on a regional basis, recognizing both their commonalities and their distinctiveness and including other crucial elements such as mixed fisheries where several species were being regulated and harvested.

Several of the Council's reports identified the compelling need for ecosystem-based salmon management to complement and, in many instances replace, the prevailing single-species and regional management regimes. The Council has pointed out the importance of understanding the inter-relationships among species and their competition, food sources and differing reactions to changing environmental conditions. It is only with consideration of these interactions and effects that salmon management may improve. For example, hypothesized changes in marine species composition in response to changing water temperatures could have a significant effect on the food available to salmon in their ocean life phase and make a significant difference on the returns of salmon in any particular year.

While government fisheries agencies have acknowledged the benefits of moving towards ecosystem-based management, they have been reluctant to change their practices and slow to implement the new techniques and approach. They have been challenged by the complexity of taking into account the wide array of factors owing to the lack of documentary evidence and by the difficulty of applying quantitative methods to account for the effect of the multiple variables. The Council's publications on ocean research and ecosystem-based management have supported the continuation of investment in analytical programs to enable the systematic consideration of ecosystem variables. They have also pointed out the importance of investing in the collection of more extensive and reliable data on ecosystem components, such as predators and food sources, that are crucial for the ecosystem management approach to be effective.

2.1.4 VARIABILITY OF RETURNS

The notion of predictability has been a mainstay of salmon management. Researchers have gathered data and information over decades of experience, building on the local traditional and ecological knowledge of generations.

While salmon returns are variable from year-to-year and cycle-to-cycle, fisheries scientists have built an extensive set of models to describe the status and prospects of salmon populations across British Columbia. Over time, fisheries management agencies developed confidence in their understanding of salmon biology and behavior, and in their capacity to deal with conditions, such as low returns in various areas.

However, unpredictability and wide variability of productivity and returns have become more prevalent features of Pacific salmon in the past two decades, particularly for Greater Georgia Basin and Fraser River area stocks. The predictions of even the best-informed scientists and fisheries managers have increasingly been far off target.

Predicting salmon productivity and returns is a notoriously difficult task, as the estimates of Fraser River sockeye returns over the past decade have vividly shown. Prediction is made all the more difficult by changing ecological conditions and factors such as climate change. The various theories and calculations that underpin salmon management information systems are typically flawed and increasingly irrelevant for some crucial stocks.

Efforts must be made to improve pre-season forecasts for many species and runs in order to prevent false expectations by the fishing industry and allay public concerns about the effectiveness of salmon conservation efforts. Better estimates of stock-contributions of various fisheries (via coded-wire tagging, DNA markers, etc.) are possible to improve the estimation of marine survival, ocean distribution and exploitation rates. The recent reliance on crude escapement indices as the basis to track productivity trends is not sufficiently rigorous to provide reliable and credible salmon stock assessments.

The Council has urged the continuation of investment by governments and the fishing sector to improve the performance of predictive tools through better assessment information and modeling. The Council has also urged greater public empathy for the difficulty in predicting abundance when faced with mutable natural conditions that cause variability in salmon returns. This has not been meant to excuse in any way the human-induced activities that compromise or undermine salmon productivity or returns. It has, instead, been intended to explain the importance of maintaining vigilant conservation for salmon. For instance, low natural productivity conditions, coupled with environmental degradation, sudden temperature changes and poor water quality, could create the "tipping point" for true disasters for many salmon stocks, driving more of them towards extinction or remnant status in just a few years.

One of the Council's early reports also explained an important aspect in the variability of salmon returns that was claimed to be related to fishing limitations that allowed "too many" salmon to spawn, undermining the productivity of the offspring. The Council's report on the matter debunked this theory, pointing out that there is a leveling off of production in high-escapement conditions, but no evidence of these situations leading to stock collapses.

2.1.5 FISHING AND HARVEST LEVELS

The amount of effort and effectiveness of fishing activity has expanded world-wide, and overfishing has had serious consequences for many stocks, including Pacific salmon in Canada. In setting harvest limits, it is important to establish and maintain sustainable catch levels, instead of exploiting the rivers and oceans beyond their capacity. Much of the conventional wisdom about British Columbia's salmon collapses is that stocks have simply been excessively exploited, and that blame should be assigned to this for what has happened to many high-profile coho, steelhead and sockeye stocks.

It has been unfortunate that the problems of Pacific salmon have been too glibly attributed to fishing and excessive catch levels. At some points in the past, the salmon harvests coast-wide were obviously excessive. Conditions such as mixed stock fishing exaggerated the problem and undermined the regulatory regimes of the time intended to control the extent and stock focus of harvesting. Nevertheless, the salmon harvest rates in Canada have been considerably reduced over the past decade, and still returns in spawner numbers have been inadequate for some species. This under-recruitment is related to conditions other than harvesting, such as urbanization, water temperatures, freshwater quality, ocean conditions, pathogens from fish farms, and many others that constitute contributing factors.

The easy blame for salmon problems attributed to fishing practices and harvesting levels has blinded many British Columbians to the importance of dealing with other factors that put the future of Pacific salmon at serious risk. The growing competition for water extraction and the exploitation of river and riparian resources, such as gravel and other sediments, are now more serious threats to the long-term sustainability of salmon than harvesting. The Council's reports have explained that the perception of salmon harvest as the primary culprit for Pacific salmon needs to be balanced by the recognition of those other effects and the need for solutions other than simply reducing or eliminating commercial, sport or First Nations fishing opportunities.

At the same time, harvest limitations are crucial tools in many instances to enable the recovery of depleted stocks. The adoption of more rigorous conservation-based fishing restrictions, such as those on gill-net fisheries, will be necessary in the future to avoid incidental losses or injuries to non-target and by-catch species. The progressive elimination of outmoded fishing practices will require additional regulatory measures and enforcement.

2.2 FRESHWATER HABITAT

The freshwater phases of the Pacific salmon and steelhead lifecycles are the most visible and possibly most vulnerable in terms of potential threats and conservation risks. The Pacific Fisheries Resource Conservation Council has been particularly innovative in its studies of freshwater habitat conditions affecting salmon and its ground-breaking development of habitat indicators of salmon health and productivity. In this respect, the Council has filled a niche in research and public information that had been overlooked for too long.

Over the past decade, the Council gradually shifted its emphasis to increase the number of reports and advisories to address salmon habitat status. The concerns about salmon and steelhead stock status were no less important, but the Council members recognized that it was possible to make a particularly significant value-added contribution to the body of knowledge about salmon habitat. The recent emergence of controversies regarding Independent Power Projects and gravel removal from streams, for example, brought habitat issues to the forefront of the Council's agenda. The importance of ensuring the environmental integrity of freshwater systems for salmon gave rise to this change in the Council's emphasis.

2.2.1 HUMAN EFFECTS ON ECOSYSTEMS

Salmon rely on specific conditions that enable them to spawn, rear and develop in their early freshwater life stages. Gravel quality and abundance, for example, are crucial for their embryonic development. Water flows and temperatures are also vital aspects that determine the productivity of salmon at the incubation stages. The rich biodiversity of salmon species and stocks of salmonids has been an evolutionary response to the physical and chemical conditions of the habitats in which these fish live. Maintaining the integrity of freshwater habitat for salmon is an essential ingredient for salmon conservation.

The Council has issued a number of reports that chronicle the salmon impacts of damming, dyking, dredging, filling and channelizing in freshwater habitat. Urbanization and agricultural development have encroached on riparian areas and have led to a variety of changes that affect salmon productivity and migrations. Even where care has been taken to minimize the effects of projects, the cumulative impacts of all of the human activities have been typically debilitating for salmon habitat.

Many of British Columbia's salmon rivers and streams have undergone major transformations to accommodate flood control and gravel extraction for industrial uses. This has involved substrate changes that have fundamentally compromised many of the province's most productive salmon areas. The sand, gravel and other sediments within and adjacent to spawning and rearing streambeds that are fundamental to the productivity of salmon and steelhead have been gradually but persistently diminished.

The Council's reports on salmon habitat have included several recommendations to mitigate the effects of forestry, mining, aquaculture and petroleum development. These have included measures to design resource extraction practices and adopt planning to minimize the environmental effects of water run-off, discharges into streams and contaminants.

The Council's report on the Heart of the Fraser region was particularly insightful about the need to manage the highly productive but complex aquatic and riparian ecosystem in a comprehensive and planned way to ensure that salmon values are given priority.

2.2.2 CLIMATE CHANGE IMPACTS

The effect of climate change on Pacific salmon and steelhead freshwater habitat has been a matter of enduring interest to the Council. The impacts of warmer water temperatures, wider variability of flows, and growing unpredictability of seasonal variations have been observed in relation to climate change. Spawning and rearing conditions and water runoff patterns have been influenced by the shifting climate regimes. The more frequent weather extremes and other fundamental changes in conditions threaten the survival of Pacific salmon and require more than an assumption that salmon can simply adapt to environmental conditions as they have in the past. Salmon and steelhead are resilient, but climate change is rapidly undermining the basis of conservation initiatives and seeming inability of governments to respond has been lessening public confidence in fisheries management.

The impacts of climate change on salmon and steelhead are beginning to be researched and understood, if only to a rudimentary extent compared to most traditional biology-related salmon research. The Council's recent report on ocean climate change research chronicled the extensive but uncoordinated research underway related to climate change and ocean conditions. Climate change has introduced a "wild card" into the already-difficult process of predicting salmon returns and adopting effective salmon stock management. While ocean conditions are also affected by climate change, those impacts are typically beyond the capacity of fisheries managers to influence or mitigate. The ocean effects need to be better understood but the capacity for restoration is primarily, for the immediate future, in freshwater conditions.

The Council's reports in recent years have included observations about the climate change impacts that led to new salmon and steelhead species distributions, demonstrating how some species and stocks appear to be much more vulnerable than others to the climate change effects on water conditions.

The Council has called for more intense efforts to incorporate adaptive salmon management practices to account for climate change. Work needs to be done to develop new analytical tools to measure the effect of climate change on different salmon and steelhead stocks, and identify mitigation options.

2.2.3 WATER ACCESS AND SHARING

Examples of water shortages and growing conflicts over access to water for fish and other uses have been examined by the Council in several reports. The experience in California, Oregon and Washington states where water for salmon has been compromised by other uses provides important lessons for British Columbia. The situation for fish in those locations and in other countries, like Australia, has led some to foresee what British Columbians will face as the human population continues to expand at a rapid pace. The situation will be exacerbated by: water withdrawals, diversions and extractions to expand for agriculture;, industrial expansion; run-of-the-river power facilities; and other activities—often at the risk of imperiling salmon and steelhead.

The Council has suggested several measures to deal with the emerging need to ration water resources in a way that is more fair and equitable, and to accommodate salmon and steelhead needs with recognition of the importance of maintaining healthy fish populations. One of the particularly important proposed measures is to establish a hydrological budgeting process that would enable all water uses and users to be considered in a rationally developed plan.

The Council has expressed concern about the withdrawals of groundwater and the long-term implications for water flows in salmon-producing areas. Where water resource management plans are being developed on a pilot basis, such as in Port Alberni and North Vancouver, the pace of the projects has been painfully slow, and streamlining of the management processes is necessary to deal with the overlapping jurisdictions and conflicting interests.

The approach being taken in the Living Water Smart program of the Province of British Columbia has been endorsed by the Council as an integrated response to water scarcity. Its multi-facetted strategy includes setting rigorous objectives and identifying important initiatives to deal with both supply and demand for water resources.

2.2.4 APPLYING LAW AND REGULATION

The Council's habitat reports have described in many instances the extensive legislation that was put into place over the past century to protect wild salmon and steelhead populations. The governments of Canada and British Columbia have enacted laws and built an elaborate legislative framework intended to safeguard salmon and steelhead resources. The Council's reports have explained in detail the legislation and regulatory measures that have stated ambitious conservation goals and have aspired to good intentions.

At the same time, the Council reports have cited the failures of governments to implement those laws and apply those regulations for salmon and steelhead conservation in ways that would fulfill the intent of lawmakers and satisfy the expectations of British Columbians. In the Council's view, there is more than sufficient legislation in place to enable wild salmon to be protected and prosper, but too often insufficient enforcement or willingness of some government officials to fulfill the intent.

A common and persistent theme expressed by participants in the extensive community meetings of the Council throughout the province was the disappointment of British Columbians with the enforcement of laws

and implementation of policies that should have provided adequate prevention or mitigation of salmon conservation problems. In most cases, the public perception is that there is lax enforcement and failure to conduct timely investigations of situations where salmon stocks are at risk. The frustration of stewardship and community groups about the inadequate enforcement of salmon protection laws and policies has become especially pervasive.

The Council's reports identified cumulative impacts on salmon from a variety of development activities and the extent of population growth impacting streams and riparian areas as the most rapidly growing threats to salmon productivity in freshwater. While environmental reviews force major development projects to take fish impacts into account in each instance, the accumulation of human impacts have led to "tipping point" detrimental conditions. While the consideration of cumulative impacts is acknowledged in recent environmental policies and legislation for environmental assessment, it is not yet tested in British Columbia in conditions that would pit salmon conservation against economic development values.

The Council's view has been that the legal and regulatory regimes of the provincial and federal governments are sufficient in their own right, but need to be applied with greater diligence and visibility. The main exception to this adequacy of legislation is the *British Columbia Water Act* for which significant amendments are long overdue. An updating of this legislation would introduce legal rights for sufficient flows for salmon and steelhead, while establishing water conservation incentives, appropriate pricing for diversion and abstraction, water allowances for fish in licensing, and planning processes that resolve competing demands between humans and aquatic ecosystems.

2.3 OCEAN SURVIVAL

While it has long been known that ocean life-stage conditions for juvenile salmon can have a significant influence on the numbers of spawners, there has been considerably less research and attention to this topic than to the freshwater phase. This reflects the technical difficulties and expense involved in ocean research. Ocean factors, including food supplies and sources, water temperatures, competition with other species, and predation, are determinants of salmon and steelhead population abundance, but these cannot be easily controlled in scientific experiments. They are largely beyond the influence and jurisdiction of salmon agencies and their managers. At the same time and because there is insufficient knowledge regarding the effects of some ocean factors, there have been significant surprises in some annual salmon returns, including this year's Fraser River sockeye runs that have confounded predictions.

The Council's reports acknowledged the difficulties of conducting ocean research relating to wild Pacific salmon. The broad scope and high cost of studies have discouraged most of the proposed initiatives aimed at ocean life stages. With so many of the potential influences—weather, climate shifts, species interaction, upwelling conditions—it has been difficult to develop research programs that can yield multiple observations under comparable conditions or isolate factors for scientific assessment purposes. Moreover, it has been difficult to justify ocean research for salmon when there have been few prospects for salmon management agencies to intervene in any tangible ways to prevent detrimental impacts and deal with causes.

2.3.1 ECOSYSTEM MODELING

In light of the limited opportunities to carry out direct observations of salmon in ocean research, scientists have worked for the past two decades towards the development of modeling of salmon ocean habitat as a way to understand those ecosystems. The models attempt to account for all of the primary contributing factors and identify the intricate webs of influences and responses.

Considerable advances have been made at the conceptual level in building the models of salmon ocean production, and beginning to express them in quantitative terms. The Council's reports dealing with the modeling of salmon ocean life-stages have included a strong endorsement of increased financial support by government agencies and charitable environmental foundations for this work.

In a recent report, the Council presented the case for consolidating Canada's research resources on ocean climate change into a research institute dedicated to considering climate variations on oceanic salmon production. The literature review on which that proposal was based identified the significant Canadian expertise in the field that could be harnessed into a new research institute to focus and coordinate the effort.

2.3.2 INVESTMENT IN OCEAN RESEARCH

While government research funding has gradually and marginally moved into studies of salmon ocean life-stages, the Council has urged a considerably stronger re-assignment of government research funding into this field.

One of the current research initiatives has involved pursuing an integrated salmon research program concentrated on the Strait of Georgia. While relatively small in scale, this program is progressively showing the value of building links between researchers and fisheries managers in knowledge exchange that enables studies, wherever possible, to address the information needs of management decision-makers.

In salmon research, and ocean-stage research in particular, there is a risk of spreading the scarce resources too thinly, both in terms of fisheries research expertise and of funding. The Council has observed that the Pacific salmon and steelhead research programs of government agencies and universities generally seem to be disjointed and chronically underfunded.

Despite the importance of salmon research funding and the advances that have occurred as a result of applying valuable scientific findings concerning these species, the case for adequate research funding, particularly for conservation, has not been made persuasively to government leaders nor has it been widely supported by stakeholders in the environmental communities. A concerted effort by fisheries scientists and the salmon and steelhead conservation community is needed if government officials are to be persuaded that further investment in relevant marine research would generate tangible results and advance the protection and restoration of these species.

2.4 RESOURCE MANAGEMENT

Under the Canadian Constitution, salmon and their habitats are the legal responsibility of the Government of Canada. Over time, this role has been shared with the provinces and territories through mutual agreements and delegation. In British Columbia, steelhead stocks and some aspects of stream protection are co-managed with the Province of British Columbia. As various Council reports have pointed out, provincial Crown land comprises vast areas of salmon and steelhead habitat. Because the Province has constitutional and legal jurisdiction for many natural resource activities in these lands, such as forestry, agriculture, highways and mining, fish productivity is profoundly affected by the decisions made by the British Columbia government. As a result, it is important for resource management and other public sector activities affecting salmon and steelhead to take place on a coordinated basis between the two senior levels of government and be collaborative in achieving mutually agreed salmon and steelhead conservation objectives.

Wild salmon are among the few natural resources for which the Government of Canada has jurisdiction, and the significance of this responsibility seems to have been misunderstood and discounted by some federal government officials in their assignment of funding and personnel to fulfill the government's fisheries obligations. The federal government budgeting process, in particular, appears to be persistently underfunding

the salmon management regime and compromising wild salmon populations. By assigning its budget resources as if salmon conservation were simply an economic commodity, rather than a constitutional obligation, the Government of Canada has been failing in one of its most fundamental environmental and regulatory responsibilities.

The growing involvement of First Nations jurisdiction and activities of aboriginal communities in salmon conservation is hampered in many instances by the lack of resources to initiate and sustain valuable projects. The assignment of financial support and access to technical resources for First Nations communities is necessary and particularly valuable to reinforce the overall salmon and steelhead conservation effort.

The current salmon protection and restoration policies of both Canada and British Columbia are compromised by an apparent unwillingness to assign sufficient financial and technical resources for conservation. The effective management of the salmon resource requires a combination of funding, clear legislated authorities, regulatory capacity, and expertise in technical and policy development.

2.4.1 FUNDING TO CONSERVE SALMON

Several Council reports have reflected the disappointment and anxiety of many British Columbians with the federal and provincial budget reductions for salmon and steelhead, particularly relating to activities aimed at their conservation. The elimination of long-standing assessment, enumeration, restoration and habitat protection programs and support over the past decade has created a clear public impression that fisheries conservation has become secondary among the federal and provincial government activities in British Columbia. Even the Wild Salmon Policy, which has been the lynchpin of the federal government's west coast salmon management program, has been chronically starved for funding. That program's implementation has lagged far behind schedule due to insufficient personnel and budget allocations, and it has been subjected to even further budget cuts in the current fiscal year.

For its part, the Province of British Columbia eliminated the innovative Fisheries Renewal program and gradually dispersed the fisheries portfolio's programs and personnel into small sub-sets of other ministries, mainly Ministry of Environment, clearly demonstrating that fisheries management and enforcement have been assigned a marginal status in the Province's agenda.

The Council's reports have observed that in the assignment of funding for salmon and steelhead conservation, both levels of government have failed in most instances to provide sufficient financial resources. Where value-for-money is calculated in government decision-making, it is apparent that the significance and benefits of salmon conservation are now seriously undervalued. Where budget decisions are being made in Ottawa and Victoria about where to invest tax dollars, fisheries conservation and protection has been assigned a negligible ranking relative to most other government expenditures.

The Council has also observed that the considerable government investment in fisheries, ocean and habitat research often appears to have too little output that is relevant or applicable to salmon stock managers. The lack of any concerted effort by government agencies to develop knowledge translation and exchange in salmon-related research has resulted in much of the recent science program appearing to be irrelevant. The failure of the salmon research programs to address the pressing problems of monitoring, enforcement and habitat could be remedied by giving precedence to knowledge translation as a crucial component and precondition for future research programs and encouraging researchers to work together with salmon stock managers.

2.4.2 SALMON CONSERVATION EXPERTISE

The Council's report on human resources and expertise for Pacific salmon and steelhead conservation management pointed out the difficulty of replacing the aging and retiring cadre of salmon specialists. Furthermore, there has been a failure to attract sufficient replacement talent into fisheries research, technical specialties and fisheries resource management. The problem is compounded by what appears to be a lack of commitment by senior officials in both levels of government to provide resources for succession planning to rebuild the nucleus of fisheries personnel.

To many British Columbians, the salmon fisheries field, and particularly the commercial fishery, is considered to be generally in decline with few prospects for future prosperity. Job opportunities in the fisheries conservation and management sector, including science, technology and research, have become limited and offer little appeal particularly when compared to other segments of the Canadian economy. The exception to this trend, of course, is the sports fishery that has grown over several decades and continues to prosper. By contrast with the commercial and aboriginal sectors, sports fishing's focus is on recreational values rather than fishing for food or ceremonial purposes.

The lack of attraction to a fisheries conservation career is compounded by the general distaste caused by high levels of confrontation among stakeholders and management agencies, and the extent of controversy about salmon policies. Salmon and steelhead management in British Columbia now exists in an atmosphere of rancor, and there is a pervasive sense of futility about working in such prevailing conditions. As a visibly low-priority government activity, fisheries management is considerably less appealing to prospective employees than it used to be.

The Council also found that the shrinking scale and size of various fisheries and the resources committed to them have made it difficult to apply innovation or justify investment in new methodologies and technologies, particularly for wild salmon and steelhead conservation activities. Even where discoveries and research findings could have considerable value in practical conservation applications, the lack of investment available to test or launch such innovation has hampered their introduction. At the same time, much of the federal and provincial government fisheries funding related to salmon has shifted into aquaculture and other functions unrelated to conservation of wild salmon and steelhead.

The skill sets required for researchers and managers are evolving from those of traditional fisheries biologists to also include those of ecosystem modelers, genetics specialists, and climate analysts. The expansion of the skills and expertise of fisheries agency and research personnel involves a difficult but necessary transition, and is occurring too slowly. A renewal of human resources and valuing of technical expertise for wild salmon conservation is required by both the federal and provincial governments.

2.4.3 STOCK MANAGEMENT APPROACH

A fundamental assumption underlying current wild stock management appears to be that the level of stock and harvest monitoring should be a function of the intensity of the fishing impacts. In short, if the objective were to derive maximum yield, then in-depth monitoring and assessment programs should have been required. But where exploitation rates are relatively low, and the stocks are not considered to be at risk, the strategy has been to manage them in a "passive" manner and not invest in monitoring.

That management approach has led to relatively low levels of assessment in many cases, such as for some Skeena River steelhead and sockeye stocks. The returns for these stocks that are subject to substantial fisheries have gradually become less numerous. Fishing operations still appear to be conducted in some cases to derive maximum economic benefits from the most productive stocks. Catch levels, in many instances, are not adjusted downwards soon enough to help rebuild weaker stocks.

Another troubling issue is that the Wild Salmon Policy's use of stock aggregates (or Conservation Units) that are monitored as a group so the status of aggregates can be ranked as being in a given zone (red, amber, green). This could mistakenly lead some biologists and fisheries managers to conclude that there is less need to conduct in-depth monitoring and assessment. The state of stock assemblages based on the criteria of Conservation Unit zones may not be sufficient to provide adequate predictability and management measures. For instance, while the Wild Salmon Policy dictates that the distribution of spawners within each Conservation Unit must be monitored, it does not specify at what level of precision and accuracy. Here again, some government biologists interpret this as requiring only spot checks rather than rigorous salmon assessment.

The continued shortcomings of salmon management practices and their potential entrenchment in some aspects of the Wild Salmon Policy need to be reviewed thoroughly and revised with a view to ensuring a comprehensive assessment program that includes attention to high-productivity areas and low-risk stocks in management decisionmaking.

2.5 COUNCIL'S IMPACT

The advice of the Council has influenced government policies and decisions in some instances, but has fallen on deaf ears in others. Some recommendations have been accepted and implemented, others have only gradually been adopted, and still others have indirectly influenced the shaping of policy decisions.

Two examples of the Council's impact on governments illustrate how both the provincial and federal fisheries agencies have responded positively in some instances to timely and constructive recommendations. The first is the influence of the Council in helping to re-craft the Wild Salmon Policy in its formative stages. While welcoming the initiative and endorsing its general approach, the Council proposed some amendments aimed at maintaining salmon and steelhead biodiversity. The resulting delays in the implementation of the Wild Salmon Policy were an unfortunate consequence, but the revised version was a vast improvement and gained widespread support from across the fisheries and stewardship communities.

Another example of the Council's positive impact was the adoption of the proposed protective measures in 2003 for migrating pink salmon juveniles in the Broughton Archipelago. Both levels of government responded to the Council's recommended action plan, involving fallowing of net-pens in migration routes, to minimize exposure of small migrating salmon fry to sea lice. Several organizations had been involved in advocating action by the governments and salmon farm companies, but the Council was the one directly involved in negotiating the policy change with governments that also led to new research programs and monitoring of wild and farmed fish. The Council members also had a hands-on role with provincial government officials to ensure that the migration routes of juvenile salmon and steelhead and other aspects of the protective measures relating to impacts on wild fish by fish farms would be both practical and comprehensive.

The Council's research and background papers have been small-scale and focused on questions that others in fisheries science and management have not been addressing. This work has been directed towards filling gaps that government and university research has not tackled. The Council's projects to develop salmon habitat indicators are recognized as ground-breaking initiatives in several respects. The extensive background reports on topics such as landscape-level impacts to fish and fish habitat in freshwater environments, in addition to modeling of marine ecosystems, have been meant to make unique contributions to acquiring additional insight on the dynamics of Pacific salmon and steelhead, rather than replicate work done elsewhere.

In fulfilling its mandate to enable governments to make better decisions related to salmon conservation, the Council has focused its limited resources in innovative areas of research and provided guidance for government decisions that was meant to be both realistic and achievable.

3. PFRCC PERSPECTIVES ON KEY ISSUES

The reports, publications and activities of the Pacific Fisheries Resource Conservation Council have dealt with several specific topics, and have involved the development of advice to address the challenges facing the future of wild Pacific salmon.

While this point might seem repetitive, it is important to note that the Council's reports, produced over the duration of its tenure, and the advice contained in them remain in most cases as valid now as they did at the time of their publication. The extensive analyses contained within the Council reports have considerable scientific and management merit, and the brief summaries provided here cannot do justice to the considerable thought, well-drafted ideas and wise counsel provided by the authors. These reports merit continued careful attention; all of them are available on-line at the Council's website, and most contain executive summaries that explain the gist of their findings and messages.

There are some broad thematic topics on which the Council has not commented directly in the past, but which now deserve attention. They concern some big-picture issues and common threads of ideas woven throughout the Council's work. They help frame the context in which the British Columbia's wild salmon should be viewed over the coming decade.

In September 2008, the Council held a workshop to celebrate the organization's tenth anniversary and to look towards the needs of salmon in the coming decade. The perspectives and observations that emerged from that event and subsequent deliberations of the Council are outlined below.

3.1 ASSUMPTIONS ABOUT THE FUTURE

In the Council's view, the coming decade is likely to see wild Pacific salmon put in far greater jeopardy than at any previous time. Among the assumptions that can and should be made are the following:

- Climate conditions will be more increasingly variable, leading to exaggerated water flows and droughts, and higher water temperatures in many cases, undermining the viability of salmon productivity.
- Government fisheries resources will continue to be under pressure to shift the proportion of their funding even further towards aquaculture and enhancement through hatchery supplementation, and away from funding of conservation and protection of wild salmon stocks in natural habitat conditions.
- Economic and return-on-investment arguments will continue to influence government decisions to favor development over conservation.
- In the allocation of priorities for access to scarce and dwindling water resources, the needs of salmon will continue to be assigned secondary considerations by authorizing and regulatory agencies.

While regional planning processes have been used in the past to help resolve conflicting claims for resource use, it will be increasingly challenging for these processes to deal with emerging issues that have recently become more evident on the public radar. Examples of such issues are run-of-the-river power proposals and so-called "green" initiatives involving the use of water that may have carbon-reduction benefits but at the same time put wild salmon habitat in greater jeopardy.

Pacific salmon and steelhead will continue to exhibit variation in behavior and productivity due to macro-level changes to climate and landscape conditions. The need to manage these species under these circumstances will challenge the ingenuity of fisheries scientists trying to distinguish the effects of short-term cyclical

phenomena (e.g., El Nino, La Nina, Pacific Decadal Oscillation) from those of long-term climate changes that affect the productivity and diversity of salmon stocks.

The public and private sector resources for salmon conservation should be expected to be even more scarce and tightly rationed in the near future. The economic recession has significantly reduced the availability of funding from private donors and led governments to redirect their resources for economic stimulus towards bricks-and-mortar investments rather than environmental protection and habitat restoration. The resulting reduction of overall funding for environmental activities is likely to become an obstacle for the maintenance of salmon conservation organizations and projects.

It should not be assumed that the current science and technology research agenda can be relied upon to deliver significant solutions to the major problems of Pacific salmon and steelhead in the coming decade unless a new fisheries science agenda is adopted. The current fisheries research and levels of funding do not appear to be leading to the kinds of innovation or applications of science that will be meaningful to advance salmon conservation. Fisheries research budgets are stretched too thinly across several fields, and salmon and steelhead research is among those that appear to be chronically underfunded.

In superficial terms, there is hardly cause for optimism in the current assumptions about the prospects for effective government action to address British Columbia's wild Pacific salmon. For many government officials, wild salmon and the fishery in general are no-win issues. They involve a complex set of problems and insatiable demands that constantly call for new funding.

In the view of many elected officials, there has been minuscule political credit gained or public acknowledgement given to the many existing programs, expenditures and political initiatives intended to solve the problems of wild salmon. To those officials who are facing competing demands for the use of tax dollars, there is little if any political credit to be gained from increasing public investment in wild salmon. The willingness to assign a priority to salmon conservation has, in many ways, reflected a waning public awareness and interest in the future of wild salmon.

3.2 SETTING ACHIEVABLE GOALS

It would be unrealistic to assume that British Columbia's wild Pacific salmon habitat could be restored to pristine conditions or eliminate the all of the influences of human habitation on salmon. However tempting it might be to think of protecting and restoring all salmon habitat, the task would be futile. The objectives in conserving Pacific salmon need to be tempered by what is realistic and achievable in current conditions. Continuing human population growth and economic development activities must be "given" factors in the assumptions about the future of salmon populations in British Columbia.

Even the assumption that it would be possible to halt further declines of salmon populations may be untenable in light of climate change effects, competition for water access for human use and consumption, and other human-induced and natural conditions beyond the influence or control of fisheries regulators and scientists. At the same time, the salmon and steelhead conservation effort cannot merely be a rear-guard action, constantly in retreat.

In creating the array of environmental laws and regulations over the past four decades, governments and the public came to believe that salmon and other vulnerable species would be effectively shielded from detrimental human-induced effects. Many British Columbians also felt that governments were adequately authorized and resourced to conserve wild salmon or at least halt any further deterioration in salmon populations. This proved to be an overly optimistic and unfulfilled expectation.

The continuing general decline in wild salmon populations has been due to many factors, several of which are beyond the ability of governments to control easily or remediate at low cost. Changes in ocean temperatures, food conditions and naturally-occurring diseases have additionally and significantly compounded the difficulty of maintaining the productivity of salmon runs across the Pacific coastal region. These are over-and-above the well-known impacts such as hydro-electric, forestry and land development, and it is difficult to partition or measure each one. While these may be mitigating factors to account for the failure to fulfill the intent of salmon conservation legislation, they cannot serve as acceptable excuses for allowing the continuing deterioration of salmon stocks and habitats.

While there is widespread public affection and desire to promote the wellbeing of wild salmon, British Columbians are not generally aware of what they could do or what "success" in salmon conservation might look like. Simply halting the decline might be a start, but the public debates about the future of wild Pacific salmon have, so far, not clearly defined or described the basic objectives in substantive ways.

3.3 RESOURCES FOR SALMON CONSERVATION

The conservation of Pacific salmon has involved the use of a relatively small toolkit of regulatory measures, hatcheries and other enhancement projects, and funding for activities to restore salmon productivity where it has been lost or under threat. Government agencies have monitored salmon through various survey and assessment programs to identify stocks and problem areas and to initiate mitigation measures, mainly in the form of fishing restrictions.

In some respects, the regulatory tools for salmon conservation have provided relatively inexpensive conservation management solutions until recently. Fisheries regulators have been able to restrict fishing as an immediate response to imminent threats to salmon stocks. They have maintained fishing limitations that, while they have been controversial in many instances, have often made the crucial difference in protecting stocks, such as the coho when they experienced drastic declines in the late 1990s.

At the same time, the scaling-down and elimination of some fishing opportunities over several years has mean that fisheries regulators are running out of conventional tools. Fisheries regulators are even now reaching the point for some stocks where fishing prohibitions are applied on a perpetual basis across virtually all commercial, sports and aboriginal fisheries, but many salmon populations will continue to decline even in those circumstances.

The regulatory tools of fishing restrictions are not enough to cope with the emerging problems of low ocean productivity and climate change impacts that are undermining salmon populations. The application of fishing restrictions year after year in many areas illustrates that this regulatory tool is no longer enough to cope with influences that are fundamentally changing conditions for wild salmon.

The $5 billion spent in recent years in the Pacific Northwest United States for salmon recovery illustrates the order of magnitude of post-disaster expenditure that may soon be required for salmon recovery in Canada. Unfortunately, it has been too late to stop further declines and extinction of some runs in Oregon and Washington states or to have enough benefit overall. A fraction of that amount invested in prevention would have staved off at least some of the worst problems, as the emphasis of regulatory agencies in those states towards supporting Salmon Strongholds partnerships has illustrated. British Columbia is facing many of the same trends and situations as those areas to the south experienced, with similar emerging impacts of climate change and competition for water resources, but Canadians have the chance to act now to prevent and mitigate the effects.

3.4 SENSE OF DIRECTION

The salmon conservation effort in Canada has appeared, in many ways, to be a constant uphill battle to head off the threats and detrimental impacts on wild salmon and steelhead. There is no apparent overall government strategy or tangible milestones for what would constitute the achievement of effective wild salmon conservation. While the Wild Salmon Policy presents a valuable initiative, its slow implementation and lack of committed resources to act on the information it produces do not give cause for optimism about its role as a lynchpin of Pacific salmon conservation.

The atmosphere of highly-charged arguments and confrontation that characterize the public debates about wild salmon is not conducive to building an effective conservation strategy or harnessing the resources of governments and stakeholders to pursue common conservation goals. Much of the public debate seems to focus on the effort to assign blame for salmon declines, rather than identifying causes and finding comprehensive practical solutions.

While initiatives such as the No-Net-Loss Policy and Wild Salmon Policy have been welcomed, they are not yet achieving the kind of impact that provides a sense of strategic direction or common cause to British Columbians or the advocates and supporters of wild salmon conservation. It has been nearly ten years since the Wild Salmon Policy was announced. The Pacific Fisheries Resource Conservation Council has been one of its most enthusiastic supporters of the Wild Salmon Policy. Furthermore, the Council endorsed it in concept and design, and has supported the efforts to implement it. The Wild Salmon Policy could be an instrumental part of a comprehensive salmon conservation plan, but needs to be given the financial and technical resources to be implemented fully and quickly. It might serve a valuable component of a Pacific salmon strategy, but does not serve that purpose in its current modest form and scale.

At various times in the past two decades, government agencies have declared that there would be a revitalization of the salmon conservation effort. While well intentioned, these initiatives, such as British Columbia's Fisheries Renewal program, were short-lived and perhaps had limited long-term benefit to salmon and steelhead. British Columbia's WaterSmart program has introduced useful conservation tools related to salmon habitat, but will need adequate investment in its implementation and careful adherence to the goals it pronounces.

4. STRATEGIES FOR CANADA'S PACIFIC SALMON

Past reports by the Pacific Fisheries Resource Conservation Council and other external salmon advisory bodies have typically contained a variety of suggestions and lists of recommendations that have, in some respects, constituted a menu from which governments could pick-and-choose from those they liked and ignore those they didn't.

In many cases the advice previously offered in the Council's reports of the past eleven years has not been implemented. Those reports should be reviewed by officials in the federal and provincial fisheries agencies once again to gain insights and be reconsidered in light of current conditions. They contain a wealth of knowledge and experience that might, in retrospect, be even more valuable now that at the time they were produced.

The problems and issues of wild Pacific salmon are complex, challenging and long-standing, they but are not necessarily insurmountable. They have to be addressed with more creativity and determination than British Columbians and Canadians have been willing to dedicate in recent years.

It is easy to paint a predominantly bleak picture or suggest dire consequences where problems remain unresolved or advice is not taken. This report and its recommendations reflect a deep concern, tempered by realistic expectations, about the prospects for effective action to enable the conservation and sustainability of wild Pacific salmon.

The Pacific Fisheries Resource Conservation Council's mandate involves presenting strategies and objectives for salmon conservation; it is not responsible for addressing the broader context of government policy that must account for social, economic, community, and other factors except as they have an impact on conservation. Those broader considerations must be taken into account in government decisions in the assignment of resources and overall priorities. It is crucial, in doing so, that the needs of wild Pacific salmon—to ensure the productivity and survival of these species and populations—are given full weight and attention. As the example of the collapse of cod stocks more than a decade ago in Eastern Canada has shown, inadvertent losses cannot be readily, if ever, restored and profoundly affect the human society that lives within that same ecosystem.

The Council is offering advice on five strategic priority topics. These suggest what the Council considers to be most important issues and action, and what can be done in practical terms.

4.1 ESTABLISH AND INVEST IN NEW RESEARCH AGENDA

Priority Issue

Effective wild Pacific salmon and steelhead conservation requires a significant transformation in the scientific research agenda of both governments and other research institutions to focus on new science and emerging needs and realities, such as climate change and ocean conditions.

Background

While fisheries science in British Columbia has made valuable contributions to the understanding and management of Pacific salmon and steelhead for many decades, its current direction is not addressing the emerging conservation problems. In recent years, research funding support and technical resources have shifted towards aquaculture and other non-salmon and steelhead fisheries issues, and away from wild salmonid conservation.

The situation now is similar to that in the 1960s when fisheries research declined in relevance for addressing the then-emerging wild salmon conservation management challenges, and required a significant re-alignment of resources and research topics to restore its value. In that instance, various research programs had to be eliminated so that new science could be pursued with a sufficient scale of resources.

The adoption of a new science agenda for salmon and steelhead conservation requires much more than a gradual or marginal shift of emphasis. It is the opinion of the Council that there needs to be a paradigm shift, involving a revamping of the current scientific programs of Canadian and British Columbian government fisheries research agencies and academic institutions. This includes a re-focus of research on salmon and steelhead conservation to topics of ecosystem-based management and ocean productivity. It also requires a linkage between research and its practical applications through knowledge exchange and joint activities by fisheries scientists and stock managers.

Supporting these positions, the innovative work linked to the Wild Salmon Policy needs to be reinforced by increased human resources and funding for relevant research. These include such concepts as the Salmon Strongholds Partnership to determine the most crucial and productive freshwater salmon habitat areas and take measures to safeguard these priority watersheds and regions.

Proposed Action

The fisheries ministers of Canada and British Columbia should both provide funding and direct their agencies to work on a collaborative basis with academic institutions and salmon research specialists to establish a new science agenda that:

- sets out the priority salmon and steelhead conservation questions to be addressed in refocused research programs;
- emphasizes salmon and steelhead ocean life-stage research in relation to climate change impacts, marine food sources and predation, and addressing unanswered questions surrounding impacts of fish farms in marine ecosystems;
- continues to pursue applications of ecosystem-based management through research that reinforces the knowledge base required for ecosystem modeling and interdisciplinary projects; and
- supports the analysis to determine the protection of high-priority salmon habitat areas across the province and identifies effective preventive measures.

4.2 SHIFT TO ECOSYSTEM-BASED MANAGEMENT

Priority Issue

The financial and human resources of government fisheries agencies need to be redirected to ensure the adoption of ecosystem-based management to serve as the primary regulatory approach in salmon conservation.

Background

The adoption of ecosystem-based management for Pacific salmon and steelhead has been slow and ineffective in too many instances. Single-stock management and other traditional wild salmon management techniques retain their usefulness in some instances, but should be progressively integrated into ecosystem-based management systems.

Ecosystem-based management involves taking holistic approaches that consider the array of interconnections across the natural environment. It requires decision-making to adopt a more comprehensive framework of influences of species on one another, as well as broad habitat scale and interaction of salmon with their natural surroundings and human impacts.

Ecosystem-based management can provide a highly effective approach by drawing together researchers and salmon and steelhead resource managers and enable them to work together through knowledge exchange and activities that integrate their work. This requires continued investment in fisheries modeling, expanded and diversified information inputs, and consideration of additional ecosystem factors that have typically not been given attention in traditional salmon and steelhead management regimes.

At the same time, investment in more extensive monitoring and assessment of Pacific salmon will be essential to provide an informed basis for modeling initiatives. The development of assessment models requires considerably more information on an array of factors and indices than is currently available.

The applications of ecosystem-based management for salmon and steelhead are beginning to prove their value in several instances around the world and in British Columbia. Initiatives such as those now underway involving ecosystem modeling of the Strait of Georgia are proving to be valuable for management decision-making. British Columbia's expertise in the development of ecosystem-based assessment and management needs to be exploited and reinforced.

Proposed Action

Ministers should instruct their departmental officials to hasten the adoption of ecosystem-based management for salmon and steelhead and create a practical toolkit of policies, information resources and management practices for its application, with specific reference to:

- enabling new skills and expertise from disciplines such as climate and oceanography to be applied to research on salmonid conservation challenges,
- building on practical applications of the unique ecosystem modeling expertise that has been developed in British Columbia and elsewhere, and
- fill information gaps via more extensive monitoring.

4.3 IMPLEMENT LAW AND POLICY

Priority Issue

Public confidence in the capacity and willingness of government managers and regulators to take adequate measures to conserve wild Pacific salmon and steelhead has become seriously eroded vis-à-vis the unwillingness of governments to enforce explicit government policy statements, legislated requirements and international commitments and to fulfill public expectations to protect and manage the fisheries resources.

Background

In its extensive community meetings and research, the Council has found that British Columbian's have lost confidence in willingness of government fisheries agencies to enforce the laws and apply the regulations that were meant to protect and restore salmon and steelhead populations. While the framework of law and regulation is both extensive and probably adequate, the widespread public opinion is that government regulatory enforcement is too lax. Further, British Columbians have observed the effects of reductions in government expenditure for salmon and steelhead conservation.

The prevailing public perception is that there is adequate legislation in place (with the singular exception of the need to update the *British Columbia Water Act*), but a persistent failure to apply it with due diligence or to an extent that actually fulfills the salmon conservation intent of the law. In this regard, the activities of salmon and steelhead managers and regulators are too often failing to fulfill the expectations of British Columbians or accomplish the objectives that were intended and promised when the laws and regulations were established to sustain wild salmon and steelhead.

Many of the recent publicly initiated lawsuits relating to wild Pacific salmon conservation have been spurred by the belief that governments are not sincerely pursuing their legislated mandates, and must be forced by external pressures to fulfill the stated terms and objectives of legislation. The often-apparent lack of government foresight or concern for preventing jeopardy for salmon has undermined public confidence in the management of the resource.

By appearing to do the minimum or less in many aspects of salmon conservation, governments have been reinforcing the public perception that they consider wild salmon to be expendable.

Proposed Action

The government ministers responsible for fisheries should jointly sponsor an independent review of the ways in which their legislation, regulations and policies are being implemented or failing to meet the test of effectiveness and public acceptance, particularly in regard to salmon-related habitat law and protection. Together, the two levels of government need to identify new ways in which their salmon-related conservation policies, enforcement and expenditures, and their programs related to issues such as sharing water access for salmon, can more adequately fulfill public expectations that measures are being taken to ensure salmon sustainability.

4.4 INVEST IN HABITAT PROTECTION AND RENEWAL

Priority Issue

The continuing deterioration of Pacific salmon and steelhead populations will require extensive intervention to protect and restore the habitat resource which is the underpinning of the sustainability of salmon and steelhead in the province. This can be done now, on a preventive basis, or will have to be done in the future on what may be a prohibitively expensive basis and in a potentially futile attempt to restore lost salmon populations and their habitats.

Background

The tools of fisheries regulatory agencies to enable conservation have been primarily in the form of limitations or controls on fishing, and applying the no-net-loss policies under the habitat provisions of the *Canada Fisheries Act*. While enhancement and salmon habitat restoration have also served important roles for salmon and steelhead recovery purposes and have been funded in various ways, much of the focus of fisheries regulatory agencies has been on imposing restrictions on timing, locations and levels of fishing as the primary management instruments for salmon and steelhead.

Conditions such as climate change effects on freshwater conditions and increasing competition for the allocation of water, particularly in drier areas of the province, are making the use of harvest limitations more often the rule than the exception for many salmon and steelhead fisheries. In some cases, such as for coho in the Strait of Georgia, even stringent fishing restrictions, supplemented by habitat restoration and enhancement, have failed to enable salmon populations to rebound. This is a cause for concern regarding the traditional reliance on harvest management as the most reliable conservation or stock rebuilding strategy.

The experience of salmon management in the United States was that inadequate prevention and responses to salmon declines led to the courts forcing the national and state governments to spend billions of dollars for restoration efforts. A similar pattern of stock problems and inadequate government responses may lead to an equivalent situation in Canada. Like the United States, the current "savings" from a continuation of inadequate investment in salmon protection and recovery may simply lead to a vastly more expensive price tag for salmon recovery within just a few years.

Arrangements which could help stave off this situation and reduce chances of further decline in at least some instances would be for Canada to invest now in preventive measures, such as establishing Salmon Stronghold Partnership habitat areas where high-value salmon and steelhead productivity can be protected on a priority basis. The reinvigoration of a salmon assessment program to inform management decisions is also a measure that could yield considerable value for more effective salmon management. It is also important to support and reinforce, wherever possible, the extraordinary contributions to salmon conservation made by British Columbia's network of volunteer streamkeepers.

Proposed Action

The ministers responsible for salmon and steelhead protection need to assess the likelihood of dramatically higher costs for future salmon restoration. They will need to obtain realistic projections of those future funding requirements in light of the expectations of near-future crises in salmon productivity and the obligations of government agencies to maintain and restore salmon populations. They should proceed soon with preventive measures and a focus on protecting high productivity watersheds and reinforcing crucial freshwater salmon habitat.

4.5 BUILD COHERENT PACIFIC SALMON STRATEGY

Priority Issue

Public anxiety is heightened by the lack of any perceived coherent government strategy or action plan to protect salmon stocks or build Canada's capacity through investment in human resources and technical expertise to ensure the future health and prospects for survival of Canada's Pacific salmon and steelhead populations.

Background

Salmon and steelhead conservation measures have become primarily reactive and defensive in response to deterioration of salmon and steelhead populations and habitats, rather than being proactive or establishing a vision of the conditions in which wild Pacific salmon would prosper and not be constantly put at risk.

Salmon management in recent years has been driven primarily by the need to respond to crisis conditions and concerns. A new path is laid out to achieve wild salmon sustainability in the Wild Salmon Policy. There is a need for government leadership to implement this new course and ensure the integrity of this government policy direction for wild Pacific salmon. The Wild Salmon Policy can be a valuable initiative, but without adequate funding it is not sufficient in its scope to enable a fisheries policy strategy that provides assurance of conservation priority. A new funding initiative is needed to provide the basis for coordinated government action towards realistic but challenging wild salmon conservation goals.

The work of organizations like the Pacific Fisheries Resource Conservation Council, with its conservation mandate, can provide only part of the vision for the future of wild salmon. The upcoming research and information-gathering activities of the Judicial Inquiry on the Fraser River Sockeye can also contribute to the identification of some potential components of an overall conservation strategy. But a concomitant funding

process is needed to build a comprehensive policy implementation program that empowers and energizes British Columbians about the future of wild Pacific salmon.

The economic, social and community aspects of salmon must also be taken into account in the formulation of a coherent strategy for salmon sustainability. With the shared jurisdiction for salmon and steelhead resources and the important role of aboriginal governments, NGOs and stakeholders across the province, the implementation of the Wild Salmon Policy must be widely inclusive.

Proposed Action

The fisheries ministers of Canada and British Columbia should initiate new funding programs to build momentum for a comprehensive sustainability effort for wild Pacific salmon and steelhead.

5. APPENDIX 1: MANDATE, MEMBERS AND TERMS OF REFERENCE

The Pacific Fisheries Resource Conservation Council provides public information and strategic advice to ministers on wild Pacific salmon and steelhead stocks, and on their freshwater and ocean habitats. It was established in September 1998 to fulfill a federal-provincial agreement, and the members serve as advisors to the fisheries ministers of the Province of British Columbia and the Government of Canada.

The Council members reflect a range of perspectives from commercial, First Nations, sports fishing, academic, not-for-profit and advocacy backgrounds. The Council has produced advisories and commissioned studies, and has published booklets, pamphlets, technical papers and background papers—in addition to sponsoring community meetings, science workshops and other events—to help inform public discussions and decisions related to wild salmon.

It contributes findings, ideas and recommendations for innovation to help shape wild salmon conservation policies and decisions by federal, provincial, territorial, municipal and First Nations leaders.

The Council members are chosen by ministers and appointed on the basis of their expertise, experience and understanding of the fisheries sector and salmon conservation issues. Together, they constitute a wide range of interests and perspectives, and they work on a consensus basis in their development of reports, technical information and policy advice. The current Council members are: Mark Angelo (Chair), The Honourable John A. Fraser, Mary Sue Atkinson, Dr. Jeff Marliave, Marilyn Murphy, Marcel Shepert, and Dr. Dick Beamish (ex-officio).

Excerpts from the 1998 terms of reference for the establishment of the Pacific Fisheries Resource Conservation Council:

The Council will provide advice to the Minister of Fisheries and Oceans, the British Columbia Minister of Fisheries and the public on matters dealing with the conservation of Pacific fish populations and the status of their freshwater and ocean habitat in British Columbia. The Council will also assist in the free exchange of information among governments, First Nations, stakeholders and the general public.

The Council is an independent body that will:

…provide strategic advice regarding stock conservation and enhancement, habitat restoration, protection and improvement, and fisheries conservation objectives

…describe the effects of conditions in freshwater and marine ecosystems on the conservation of Pacific salmon

…review and make recommendations pertaining to research programs, stock and habitat assessments, enhancement initiatives, and government policies and practices

…integrate scientific information with knowledge and experience of First nations, stakeholders and other parties

…alert the Minister of Fisheries and Oceans and the public on issues which threaten the achievement of departmentally-defined conservation objectives

…provide information to governments and the public on the status of Pacific salmon stocks and their freshwater and ocean habitat in order to enhance understanding and support for fish conservation and habitat protection

6. APPENDIX 2: LIST OF COUNCIL PUBLICATIONS

All of the reports and other publications listed below are accessible on the website of the Pacific Fisheries Resource Conservation Council at www.fish.bc.ca.

Annual Report 1998–1999 (PFRCC, released June 1999)

Freshwater Habitat (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, June 1999)

Salmon Stocks (Background paper authored by Dr. Carl Walters and Josh Korman, June 1999)

Fraser River Sockeye (Background paper authored by Dr. Rick Routledge and Ken Wilson, June 1999)

Coast-Wide Coho (Background paper authored by Dr. Rick Routledge and Ken Wilson, June 1999)

Climate Change and Salmon Stocks (Conference Proceedings Summary, October 1999)

Annual Report 1999–2000 (PFRCC, released May 2000)

Water Use Planning: A Tool to Restore Salmon and Steelhead Habitat in British Columbia Streams (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, May 2000)

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 Dr. Randall Peterman and Brian Pyper, May 2000)

Sand and Gravel Management and Fish-Habitat Protection in British Columbia Salmon and Steelhead Streams (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, May 2000)

State of Salmon Conservation in the Central Coast Area (Background paper by Allen Wood, May 2000)

The Wild Salmon Policy and the Future of the Salmonid Enhancement Program (Council Advisory, June 2000)

Salmon Conservation in the Central Coast (Council Advisory and Background paper by Allen Wood, March 2001)

A Crisis in Fisheries Education (Council Advisory, September 2001)

The Role of Public Groups in Protecting and Restoring Freshwater Habitats in British Columbia, with a Special Emphasis on Urban Streams (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, September 2001)

Annual Report 2000–2001 (PFRCC, released December 2001)

Annual Report 2001–2002 (PFRCC, released October 2002)

The Protection of Broughton Archipelago Pink Salmon Stocks (Council, Advisory, November 2002)

Making Sense of the Salmon Aquaculture Debate: Analysis of Issues Related to Netcage Salmon Farming and Wild Salmon in British Columbia (Background report prepared by Julia Gardner, David L. Peterson, Allen Wood and Vicki Maloney, January 2003)

Wild Salmon and Aquaculture in British Columbia (Council Advisory, January 2003)

Annual Report 2002–2003 (PFRCC, released August 2003)

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)

The Salmon Aquaculture Forum: Discussion Paper on Practices & Findings (Background paper prepared by Kenneth Beeson and the Honourable John Fraser, December 2003)

The Salmon Aquaculture Forum: Briefing Note for Ministers (Background paper prepared by Kenneth Beeson and the Honourable John Fraser, December 2003)

Pacific Salmon Resources in Central and North Coast British Columbia (Background paper prepared by Dr. Brian Riddell, February 2004)

Salmon Conservation Challenges in British Columbia with Particular Reference to Central and North Coast (Council Advisory, February 2004)

Making Sense of the Debate About Hatchery Impacts: Interactions Between Enhanced and Wild Salmon on Canada's Pacific Coast (Background report prepared by Julia Gardner, David L. Peterson, Allen Wood and Vicki Maloney, March 2004)

Annual Report 2003 (PFRCC, released April 2004)

Does Over-Escapement Cause Salmon Stock Decline? (Technical paper prepared by Carl Walters, Paul LeBlond and Brian Riddell, April 2004)

Reality Stewardship: Survival of the Fittest for Community Salmon Groups (Background paper prepared for PFRCC and Vancouver Foundation by Brian Harvey and David Greer, April 2004)

The Evolution of Commercial Salmon Fisheries in British Columbia (Background report prepared by Stuart Nelson and Bruce Turris, December 2004)

Annual Report 2004 (PFRCC, released April 2005)

Perspectives on Salmon Enhancement and Hatcheries: What the Council Heard (PFRCC, May 2005)

Conflicts Between Agriculture and Salmon in the Eastern Fraser Valley (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, June 2005)

Selection and Use of Indicators to Measure the Habitat Status of Wild Pacific Salmon (Background paper, February 2006)

Managing Pacific Salmon for Ecosystem Values: Ecosystem Indicators and the Wild Salmon Policy (Background paper, March 2006

First Nations, Salmon Fisheries and the Rising Importance of Conservation (Background paper, April 2006)

The Evolution of Recreational Salmon Fisheries in British Columbia (Background paper, June 2006)

Feeling the Heat: Can We Help Salmon Survive? (Council pamphlet, June 2006)

Annual Report 2005 (PFRCC, released June 2006)

Implementing the Habitat and Ecosystem Components of the Wild Salmon Policy (Council Advisory, October 2006)

What's Happening in Your Community? What the Council Heard: Vancouver Island Public Meetings (PFRCC, released October 2006)

An Ecosystem-based Approach to Managing Salmon in Georgia Strait (Council Advisory, June 2007)

Annual Report 2006 (PFRCC, released June 2007)

Report on Habitat Threats: Major Impacts on British Columbia Fish and Fish Habitat and Human Activities That Cause Those Impacts (Background paper authored by Otto Langer, June 2007)

Helping Pacific Salmon Survive the Impact of Climate Change on Freshwater Habitats (Background paper authored by Essa Technologies Limited, September 2007)

Helping Pacific Salmon Survive the Impact of Climate Change on Freshwater Habitats: Case Studies (Background paper by Essa Technologies Limited, September 2007)

What's Happening to Wild Salmon in Your Community? What the Council Heard: BC Interior Public Meetings (PFRCC, released June 2007)

Saving the Heart of the Fraser: Addressing the Human Impacts to the Aquatic Ecosystem of the Fraser River, Hope to Mission, British Columbia (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, November 2007)

What's Happening to Wild Salmon in Your Community? What the Council Heard: North Coast Public Meetings (PFRCC, released March 2008)

Mountain Pine Beetle: Salmon Are Suffering Too (Council pamphlet, March 2008)

Climate Effects on Pacific Salmon in the Ocean (Background paper authored by Dr. D.B. Preikshot, April 2008)

What's Happening to Wild Salmon in Your Community? What the Council Heard: Mid and Upper Fraser Public Meetings (PFRCC, released July 2008)

Annual Report 2007 (PFRCC, released July 2008)

Computer Modeling of Marine Ecosystems: Applications to Pacific Salmon Management and Research (Background paper authored by Dr. D.B.Preikshot, October 2008)

Public Summary—Computer Modeling of Marine Ecosystems: Applications to Pacific Salmon Management and Research (Public information paper authored by Dr. D.B. Preikshot, April 2008)

What's Happening to Wild Salmon in Your Community? What the Council Heard: Fort Langley and Sechelt Public Meetings (PFRCC, released January 2009)

Responsible Fishing In Canada's Pacific Region Salmon Fisheries (Background paper authored by Elmar Plate, Robert C. Bocking and Karl K. English, February 2009)

Landscape-Level Impacts to Salmon and Steelhead Stream Habitats in British Columbia (Background paper authored by Dr. Marvin Rosenau and Mark Angelo, March 2009)

Pacific Salmon in Canada's Arctic Draining Rivers, With Emphasis on Those in British Columbia and the Yukon (Background paper authored by J.R. Irvine, E. Linn, C. McLeod and J.D. Reist, March 2009)

Annual Report 2008 (PFRCC, released April 2009)

What's Happening to Wild Salmon in Your Community? What the Council Heard: Haida Gwaii / Queen Charlotte Islands Public Meetings (PFRCC, released April 2009)

Applying the Salmon Stronghold Concept in Canada (Background paper authored for the PFRCC by Kenneth Beeson, June 2009)

Status of Pacific Salmon Resources in Southern British Columbia and the Fraser River Basin (Background paper authored by Marc Labelle, July 2009)

Freshwater for Fish and People: Moving Towards "Living Water Smart" (Background paper authored by Marc Nelitz, Tanis Douglas and Murray Rutherford, July 2009)

Freshwater for Fish and People (Council pamphlet, July 2009)

The Nisga'a Fisheries Management Program: A Model for Sustainability Under Stress (Council pamphlet, November 2009)

Developing a Wild Salmon Policy Review Framework: Stakeholder Perspectives on Review Components (Background paper prepared by Dr. Julia Gardner, January 2010)

North American Salmon Stronghold Partnership: Harrison Basin Certification Application (Background paper by Gordon Ennis, January 2010)

PACIFIC FISHERIES RESOURCE CONSERVATION COUNCIL

Conseil pour la conservation des ressources halieutiques du pacifique

PREPARED FOR

Pacific Fisheries Resource Conservation Council

Suite 290, 858 Beatty Street, Vancouver, BC V6B 1C1

www.fish.bc.ca