PART TWO

Previous reports and government responses

Introduction

The Terms of Reference direct me to set out in my interim report my "preliminary views on, and assessment of, any previous examinations, investigations or reports" that I consider relevant to the commission, and "the Government's responses to those examinations, investigations and reports."

Over the past three decades, there have been dozens of examinations, investigations, and reports into the Pacific fisheries, primarily focusing on DFO's management of the fishery and its legislative powers respecting harvesting, protection of habitat, protection of wild salmon stocks, and aquaculture. Some, such as Dr. Peter Pearse's 1982 report, were sweeping in nature, examining the condition, management, and utilization of all Pacific coast fisheries. Others, such as the Hon. Bryan Williams's 2005 report, which examined only the 2004 Fraser River sockeye salmon return, focused on a single event.

In May 2010, DFO provided to the commission a 289-page document entitled "Recommendations Related to Fraser River Sockeye Salmon and Responses by the Government of Canada, 1982–2010" (hereafter referred to as Recommendations and Responses). It set out the recommendations contained in 25 reports prepared between 1982 and 2005 and the federal government's initial responses drawn from various sources, including statements by the minister, and written government or DFO responses. In some cases, such as reports by the Auditor General of Canada, the government's responses were included in the reports themselves. This DFO document has been an invaluable resource for the commission. It is included on the CD appended to this report.

DFO stated that, in preparing this document, it limited its review to specific types of reports:

> The reports contained in this compilation spanned the period 1982–2005, and included those commissioned by the Government as well as those prepared for the Government including the Auditor General of Canada and the Standing Committee on Fisheries and Oceans. These reports were chosen on the basis that they focused exclusively on the Fraser River or contained significant recommendations pertaining to Fraser River sockeye. Reports that were not initiated by, or prepared for, the Government of Canada were not included in this document.

In this Part, I will refer to 22 of the 25 reports that are included in the DFO document. I have also included in my consideration reports from several other sources, including provincial auditors general, provincially appointed commissions, and reports commissioned by Aboriginal organizations and by an environmental non-governmental organization. In the case of most of these other reports, the commission is not aware of any formal Government of Canada responses to recommendations contained in them.

In deciding what previous reports to consider, I took several factors into account. Of principal interest were the reports that were relevant to the specific mandate of this commission of inquiry – the Fraser sockeye fishery. However, I also considered it important to review reports that dealt more generally with various aspects of West Coast fisheries, such as DFO management, conservation, and habitat protection, and the potential impact of open-pen salmon farms on wild salmon stocks.

This Part is divided into two sections. In the first section, I will identify each report that I have considered, will comment on each report's terms of reference, and will provide the historical context within which the report was prepared. If the federal government advised the commission of its formal response to the report, I will identify that response. The government's responses come from a variety of sources, including ministerial statements, DFO news releases or backgrounders, cabinet committee reports, and formal responses from DFO. These responses, many of which may be difficult for the public to locate, were provided to the commission by DFO in Recommendations and Responses.

In the second section, I will set out the recommendations that I consider most relevant to my mandate, followed by the Government of Canada's formal responses to those recommendations. I determined that it would be informative to cluster the recommendations contained in the previous reports and the government's responses to them according to subject matter; within each category, I then set them out chronologically, so that the reader can gain an appreciation of how analyses on discrete issues have evolved.

In most cases I will limit myself to the government's initial response to these reports, even though DFO's Recommendations and Responses also provides information about the government's "subsequent actions."

I want to make it clear that, in this section, I am presenting only what the government has said was its response to particular recommendations. Readers should not infer from this presentation that the commission has accepted or is endorsing such responses. I expect that counsel will explore during the evidentiary hearings how DFO and other government departments and agencies have dealt with some of these issues since the recommendations and initial responses were made.

In Part Three of the report, I will provide my preliminary views on and assessment of these previous reports, and of the government's responses to them.

Previous examinations, investigations, and reports

Previous reports reviewed by the commission

Table 2: Reports Reviewed by the Commission

Year	Title	Organization	Author, or committee chair	Abbreviated reference
1982	*Turning the Tide – A New Policy for Canada's Pacific Fisheries*	Commission on Pacific Fisheries Policy	Dr. Peter Pearse	Pearse (1982)
1992	*Managing Salmon in the Fraser*	Report to the Minister on the Fraser River Salmon Investigation	Dr. Peter Pearse, Dr. Peter Larkin	Pearse and Larkin (1992)
1995	*Fraser River Sockeye 1994, Problems and Discrepancies*	Report of the Fraser River Sockeye Public Review Board	Hon. John Fraser	Fraser (1995)
1995	*Report to the Minister of Fisheries and Oceans on the Renewal of the Commercial Pacific Salmon Fishery*	Pacific Policy Roundtable	Louis Tousignant	Pacific Policy Roundtable (1995)
1996	*Tangled Lines: Restructuring in the Pacific Salmon Fishery*	A Federal-Provincial Review of the Mifflin Plan		Federal-Provincial Review of the Mifflin Plan (1996)

[cont'd]

[cont'd]

Year	Title	Organization	Author, or committee chair	Abbreviated reference
1997	*Pacific Salmon: Sustainability of the Resource Base*	Report of the Auditor General of Canada		Auditor General (1997)
1998	*The West Coast Report*	Report of the Standing Committee on Fisheries and Oceans	Charles Hubbard	Standing Committee (1998)
1999	*Pacific Salmon: Sustainability of the Fisheries*	Report of the Auditor General of Canada		Auditor General (1999)
2000	*The Effects of Salmon Farming in British Columbia on the Management of Wild Salmon Stocks*	Report of the Auditor General of Canada		Auditor General (2000)
2001	*Independent Review of Improved Decision Making in the Pacific Salmon Fishery*	Institute for Dispute Resolution, University of Victoria	Stephen Owen, Maureen Maloney	Institute for Dispute Resolution (2001)
2001	*Clear Choices, Clean Waters*	Inquiry into Salmon Farming in British Columbia	Hon. Stuart Leggatt	Leggatt (2001)
2003	*The 2001 Fraser River Salmon Fishery*	Report of the Standing Committee on Fisheries and Oceans	Tom Wappel	Standing Committee (2003)
2003	*Review of the 2002 Fraser River Sockeye Fishery*	Report of the External Steering Committee	Patrick Chamut	Chamut (2003)
2004	*Treaties and Transition: Towards a Sustainable Fishery on Canada's Pacific Coast*	Report of the Federal-Provincial Task Force	Dr. Peter Pearse, Prof. Donald McRae	Pearse and McRae (2004)
2004	*Our Place at the Table: First Nations in the B.C. Fishery*	Report by the First Nation Panel on Fisheries	Russ Jones, Marcel Shepert, Neil J. Sterritt	First Nation Panel (2004)
2004	*Recommendations for Change*	Report of the Commissioner for Aquaculture Development to the Minister of Fisheries and Oceans Canada	Yves Bastien	Commissioner for Aquaculture Development (2004)

Year	Title	Organization	Author, or committee chair	Abbreviated reference
2004	*Salmon Stocks, Habitat, and Aquaculture*	Report of the Federal Commissioner of the Environment and Sustainable Development		Commissioner of the Environment and Sustainable Development (2004)
2004	*Salmon Stocks, Habitat, and Aquaculture*	Report of the Auditor General of New Brunswick		Auditor General of New Brunswick (2004)
2005	*Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon*	Auditor General of British Columbia Report 5		Auditor General of British Columbia (2005)
2005	*Part One: Fraser River Sockeye Report*	2004 Southern Salmon Fishery Post-Season Review	Hon. Bryan Williams	Williams (2005)
2005	*Here We Go Again ... Or the 2004 Fraser River Salmon Fishery*	Report of the Standing Committee on Fisheries and Oceans	Tom Wappel	Standing Committee (2005)
2005	*An Assessment of Fisheries and Oceans Canada Pacific Region's Effectiveness in Meeting Its Conservation Mandate*	David Suzuki Foundation	David L. Peterson, Allen Wood, Julia Gardner	David Suzuki Foundation (2005)
2007	*Final Report,* Volume One	Special Committee on Sustainable Aquaculture, Legislative Assembly of British Columbia	Robin Austin	BC Special Committee on Sustainable Aquaculture (2007)
2009	*Final Report and Recommendations*	Report of the BC Pacific Salmon Forum	Hon. John Fraser	Fraser (2009)
2009	*Protecting Fish Habitat*	Report of the Commissioner of the Environment and Sustainable Development		Commissioner of the Environment and Sustainable Development (2009)
2010	*Priorities and Strategies for Canada's Wild Pacific Salmon and Steelhead*	Pacific Fisheries Resource Conservation Council		Pacific Fisheries Resource Conservation Council (2010)

Mandates of previous reports

Pearse (1982). Dr. Peter Pearse, a University of British Columbia natural resources economist, was appointed by the federal government in January 1981, under Part 1 of the *Inquiries Act*, to be sole commissioner of the Commission on Pacific Fisheries Policy. His terms of reference were sweeping – to examine, report on, and make recommendations concerning the condition, management, and utilization of the fisheries of the Pacific coast of Canada, including:

- the condition of the stocks of fish, current levels of utilization, and their relationship to optimal rates of use;
- the provisions for conservation, management, protection, and development of the fish resources, including the protection of their tidal and non-tidal habitat and the enhancement of salmonid stocks;
- the structure and size of the commercial fishing fleet;
- the policies and procedure for licensing commercial fishing and for regulating the size and structure of the fishing fleet; and
- the nature and amount of non-commercial fishing in tidal and non-tidal waters for salmonid species, its impact on the commercial fishery, and the policies and procedures for regulating non-commercial fishing.

He was instructed to make recommendations toward ensuring that

- the fish resources and their use make the highest possible contribution to the economic and social development of the people of Canada – this contribution may be realized in economic, recreational, and other social forms;
- the granting of fishing privileges to commercial, recreational, and Native food fishers is conducive to proper management and conservation, to an equitable division of the catch among sectors, and to economic efficiency in the development of the commercial fishing fleet;
- the charges levied by the Crown for rights to fish commercially are consistent with the value of the resources recovered;
- the vigour of the fishing industry is maintained and advanced, and its structure, ownership, and control are consistent with industrial efficiency; and
- provisions for management, enhancement, and protection of the fish resources are systematic and efficient.

Response: According to DFO's Recommendations and Responses, the government's first response to this report was contained in the June 21, 1983, Report of the Cabinet Committee on Economic and Regional Development.

Pearse and Larkin (1992). In September 1992, the minister of fisheries and oceans appointed Dr. Pearse as an independent adviser to conduct an investigation into the apparent disappearance of 482,000 sockeye salmon on their way to spawning grounds in the Fraser River system. He was directed to identify the reasons for this shortfall and to recommend any corrective measures needed for the future. The minister also appointed Dr. Peter Larkin as scientific and technical adviser. Dr. Larkin produced a separate technical appendix, entitled *Analysis of Possible Causes of the Shortfall in Sockeye Spawners.*

Response: "Statement by John C. Crosbie, Minister of Fisheries and Oceans: Action Plan in Response to the Report of the Fraser River Salmon Investigation, December 7, 1992."

Fraser (1995). In the fall of 1994, a discrepancy of an estimated 1.3 million Fraser River sockeye salmon was discovered, followed shortly thereafter by a further shortfall in the Late run, which includes the famous Adams River run. The minister of fisheries and oceans appointed the Fraser River Sockeye Public Review Board, under the chairmanship of the Hon. John Fraser, PC, QC, a former minister of fisheries and oceans and former speaker of the House of Commons. The board had three main objectives:

- to identify the reason(s) for the discrepancies in the expected and actual number of sockeye salmon arriving on the spawning grounds;
- to evaluate the accuracy of the Pacific Salmon Commission's methodology for estimating run sizes and sockeye escapement in the Fraser River; and
- to make recommendations on how any deficiencies could be corrected, beginning in 1995.

The terms of reference called for a review that would include consideration of the following areas:

- the accuracy of estimates of the number of sockeye salmon moving past the Pacific Salmon Commission's hydroacoustic facility at Mission in 1994, for each of the four major run components – Early Stuart, Early Summer, Summer, and Late Summer;
- the accuracy of estimates of the catch of sockeye salmon in the Fraser River in 1994, including an examination of the reliability of the in-river catch-monitoring program, techniques used to estimate catches, and procedures for estimating the confidence range around the catch estimates;
- the level of mortality experienced by sockeye salmon in the Fraser River and on the spawning grounds in 1994, including the causes and effect of elevated water temperatures in the Fraser River;

- the accuracy of estimates of the number of sockeye salmon on the spawning grounds in 1994, including a review of the various techniques used to enumerate sockeye salmon on the spawning grounds;
- in consultation with the Pacific Salmon Commission, an examination of the methods used by the commission to predict returning run strength and escapement, both pre-season and in-season; and
- the level and efficacy of the department's stock management, surveillance, monitoring, and enforcement activities in the Fraser River and elsewhere where relevant.

Response: *Fraser River Sockeye 1994: Detailed DFO Response to the Report of the Fraser River Sockeye Public Review Board*, 1995.

Pacific Policy Roundtable (1995). The minister of fisheries and oceans appointed a broadly based group to make recommendations on intersectoral allocations, guided by the following principles:

- conservation – to conserve and protect the fisheries resource and its habitat in trust for future generations;
- economic viability – to ensure the best use of the resource, an economically viable fishery, organized around sound business principles; and
- partnership – to create a joint vision for Pacific fisheries with stakeholders and to share responsibility for resource development and fishery management, including management costs, decisions, and accountability.

Response: According to DFO's Recommendations and Responses, the government's initial response was contained in a January 23, 1996, news release.

Federal-Provincial Review of the Mifflin Plan (1996). In 1996, the governments of Canada and British Columbia established a three-member panel to review the impact of the Mifflin Plan, the cornerstone of which was an $80 million federally funded voluntary licence retirement program or "buy-back" scheme. It also provided for single gear–type licensing, single-area licensing, and licence stacking. The panel's report was to include:

- an assessment of the short-term and longer-term impact of the plan on coastal communities, individuals, and corporate concentration;
- recommendations for determining appropriate adjustment measures; and
- proposals for improvements to the plan.

Response: According to DFO's Recommendations and Responses, the government's initial response was contained in a January 1997 backgrounder.

Auditor General (1997). According to the Auditor General of Canada, Canada's ability to sustain the Pacific salmon resource at the present level and diversity was questionable, given the various factors influencing salmon survival, many of which were beyond the government's control. Although some major salmon stocks had been built up, others were declining and many were considered threatened. There was evidence that habitat loss was contributing to these declines, but no overall status report on salmon habitat was available to assess the impact of habitat loss on the resource.

In view of the complex issues associated with the conservation and protection of the salmon resource and its habitat and the management of fisheries, the auditor general divided the audit into two phases:

- This report addressed the sustainability of the salmon resource base, with an emphasis on the conservation and protection of habitat.
- A 1999 report would address the sustainability of the salmon fisheries, including fisheries management and the allocation of catch.

Response: The government's response was contained within the Auditor General's Report.

Standing Committee (1998). During January 1998, the Standing Committee on Fisheries and Oceans visited 10 communities on the coast of British Columbia to solicit the views of fishers, fishing organizations, community leaders, community organizations, and individuals about the management of the fisheries on Canada's West Coast.

Response: *Government Response to the Fourth Report of the Standing Committee on the Fisheries and Oceans (The West Coast Report)*, April 1999.

Auditor General (1999). According to the auditor general, natural factors (such as the effects of global warming on marine and freshwater temperatures, as well as fluctuating ocean productivity), human factors (such as overfishing and loss or deterioration of habitat), and economic factors (such as commercial fleet overcapacity and competition in the marketplace from a growing salmon-farming

industry) were contributing to a decline in fishing opportunities, success rates, and value of the catch. DFO's challenge was to conserve existing stocks and rebuild those that were at risk, while maintaining viable fisheries.

The focus of this audit was to determine if the Pacific salmon fisheries were being managed to ensure the conservation of the resource base and the sustainability of the fisheries. It reviewed existing problems and actions taken by DFO to respond to the new management challenge in three major areas:

- policy development and planning;
- fisheries and information management; and
- government-stakeholder consultations.

Response: The government's response was contained within the Auditor General's Report.

Auditor General (2000). The objective of this audit was to determine whether DFO, as the department responsible for the conservation and protection of wild salmon stocks, was "meeting its obligations under the *Fisheries Act,* the *Oceans Act* and other legislation while participating in the regulation of the salmon farming industry in British Columbia."

The audit examined aspects of DFO's regulatory role in this area, including its operational responses to current and emerging environmental and ecological problems posed by the industry. The audit did not include DFO's salmon enhancement program.

In order to focus on DFO's need for compatibility of salmon-farming management with its core responsibilities for wild salmon management, the auditors asked three questions:

- Has DFO identified and evaluated the effects of salmon farming on wild stock management by following a risk management plan?
- Has DFO formulated an action plan to deal with salmon farming, together with a strategy for its integration into the wild salmon management plan(s) to ensure consistency with the established principles of conservation and the precautionary approach?
- If such an action plan exists, is DFO implementing its elements?

Response: The government's response was contained at the end of the Auditor General's Report.

Institute for Dispute Resolution (2001). In conjunction with DFO's discussion paper, "A Framework for Improved Decision-Making in the Pacific Salmon Fishery," the institute was appointed to organize a public consultation on key issues with a wide range of government and stakeholder groups, including DFO, the provincial government, local governments, First Nations, commercial fishers and processors, recreational fishers, community associations, environmental organizations, and academics. The independent review focused on three key aspects of salmon consultation processes in the Pacific Region:

- annual salmon harvest management planning;
- implementation issues associated with the Pacific Allocation and Licensing Board; and
- the policy development process for issues related to salmon fisheries management.

The institute consulted more than 350 individuals and organizations with an interest in the salmon industry.

Response: According to DFO's Recommendations and Responses, there was no formal, immediate response to this report.

Leggatt (2001). The David Suzuki Foundation established this independent inquiry in response to calls from the Auditor General of Canada and the Senate for public consultation and review. Stuart Leggatt, a retired BC Supreme Court judge, was appointed commissioner. He set his own terms of reference and guidelines. This "citizen's inquiry" asked for community and public input on the salmon-farming industry, to help it formulate recommendations to be passed on to the prime minister of Canada, the premier of British Columbia, and the public.

Response: The commission is not aware of any federal government response to this report.

Standing Committee (2003). Despite substantial runs of several species of salmon on the Fraser River, the BC commercial salmon-fishing fleet was effectively shut out of the fishery in the 2001 fishing season. Some sectors of the fleet had minimal openings, while others did not fish at all. Between 1998 and 2001, the commercial fishery was virtually shut down. The impact on the lives of the fishers and other workers who depend on the commercial fishery was devastating. At the request of concerned fishers, the Standing Committee on Fisheries and Oceans conducted a study to determine why this shutdown

happened and what might be done to prevent such failures from recurring in the future.

The committee met with representatives of the fishing industry over two days of hearings in Steveston and Richmond, BC. It also held a hearing with DFO officials and a separate hearing with representatives of the BC Aboriginal Fisheries Commission.

Response: *Government Response to the 6th Report of the Standing Committee on Fisheries and Oceans – The 2001 Fraser River Salmon Fishery*, 2003.

Chamut (2003). In 2002, the abundance and timing of some sockeye salmon stocks returning to the Fraser River were dramatically different from pre-season forecasts. Controversy arose over the appropriate conservation measures for the resource, the management of the fishery, and the response of DFO to those changed circumstances. The timeliness and accuracy of information, the decision-making process – particularly in the face of uncertainty – and the consultation processes all came into question.

In September 2002, the minister of fisheries and oceans ordered a post-season review. Patrick Chamut, the assistant deputy minister of fisheries management, chaired an external steering committee composed of members from the Province of British Columbia, the Pacific Fisheries Resource Conservation Council, First Nations, commercial and recreational organizations, the Pacific Salmon Commission, a conservation organization (the Sierra Club), and the department's regional director general (Pacific Region).

The intent of the review was to focus on Fraser River sockeye management, with particular emphasis on

- conservation objectives
- consultation processes
- risk management
- adequacy of data
- decision-making processes
- enforcement
- DFO's management process

The objective was to develop recommendations to improve future management of Fraser River sockeye and the fisheries that depend on those stocks.

Response: *Status of Implementation of 2002 Fraser River Sockeye Review Recommendations*, December 3, 2003.

Pearse and McRae (2004). In July 2003, the federal minister of fisheries and oceans and British Columbia's minister responsible for treaty negotiations and minister of agriculture, food and fisheries established an independent two-person task force consisting of Dr. Peter Pearse and international law professor and former law dean Donald McRae. The reason for the inquiry was the need to examine carefully the changes taking place in the fisheries – where those changes were leading, and how they could be reconciled with the public interest in both treaty settlements and prosperous, sustainable fisheries.

The terms of reference included:

- defining a broad vision of the post-treaty fishery, including identifying how fish will be shared among treaty and non-treaty participants and associated management challenges;
- examining management challenges associated with post-treaty fisheries and identifying equitable arrangements that will provide for sustainable, integrated fisheries management for treaty and non-treaty fisheries;
- identifying approaches to offset impact on existing fish harvesters who are affected by the reallocation of fish to meet treaty obligations;
- proposing means to enhance the economic performance of the fishery, including the design of fishing arrangements that provide secure long-term access to harvesters, as well as co-operative initiatives to support a sustainable fishery; and
- undertaking other works as the parties deemed necessary.

The reviewers were asked to define a "vision" of the fisheries in a post-treaty era and to make recommendations that would provide certainty for all participants in the fisheries, ensure conservation of the resource, provide for sustainable use and effective management, improve the economic performance of the fisheries, and provide equitable arrangements among fishers and fair treatment of those adversely affected by treaty settlements.

Response: According to DFO's Recommendations and Responses, the government's initial response to this report was contained in a May 5, 2004, news release.

First Nation Panel (2004). First Nations were concerned that the Canadian and BC governments did not consult with them prior to the naming of the Pearse and McRae task force, and that no First Nation leader was appointed to it. In late 2003, the federal government agreed, at the request of the BC First Nations Summit and the BC Aboriginal Fisheries Commission, to fund a parallel process. The three-member First Nation Panel on Fisheries was appointed by a steering committee made up of leaders of the First Nations Summit and the Aboriginal Fisheries Commission.

The panel was asked

- to articulate a vision for the future management and allocation of the fisheries and to identify what principles would help to achieve that vision; and
- to describe a workable framework for management that would provide some certainty to users in terms of access and use of fisheries resources.

The panel held public meetings in seven BC communities; considered written and oral submissions; and commissioned reports on the case law surrounding Aboriginal rights to fish, on an analysis of treaties and other processes relating to fisheries allocation and management, on analyses of situations in other jurisdictions, and on an analysis of various fisheries in different parts of British Columbia.

Response: According to DFO's Recommendations and Responses, the government's initial response to this report was contained in the same May 5, 2004, news release as the Pearse and McRae report.

Commissioner for Aquaculture Development (2004). The Office of the Commissioner for Aquaculture Development was established by the minister of fisheries and oceans in December 1998 to advise the minister on matters pertaining to aquaculture in Canada. The commissioner was asked to champion aquaculture within the federal government and to accelerate the implementation of the Federal Aquaculture Development Strategy, launched by DFO in 1995. In 2004, the commissioner prepared a report for the minister, giving a long-term vision for aquaculture in Canada and providing the minister with specific recommendations on the appropriate federal role to help achieve this vision and fully implement the Federal Aquaculture Development Strategy.

Response: The commission is not aware of a federal government response to this report.

Commissioner of the Environment and Sustainable Development (2004). The commissioner (a position within the Office of the Auditor General) undertook this follow-up study, which was performed concurrently with related audit projects undertaken by the auditors general of New Brunswick and British Columbia (see below); it focused on the action taken by DFO on key observations and recommendations made by the Auditor General of Canada in the 1997, 1999, and 2000 reports:

- in 1997, when the auditor general reported that Pacific salmon stocks and habitat were under stress;
- in 1999, when the auditor general found that Pacific salmon fisheries were in trouble – the long-term sustainability of the fisheries was at risk because of overfishing, habitat loss, and other factors; and
- in 2000, when the auditor general reported that DFO was not fully meeting its legislative obligations to protect wild Pacific salmon stocks and their habitat from the effects of salmon aquaculture operations.

Consequently, this review assessed DFO's progress in conserving and protecting salmon stocks and their habitat, ensuring sustainable use of salmon fisheries resources, and regulating salmon aquaculture in British Columbia and New Brunswick.

Response: The government's response was contained within the commissioner's report.

Auditor General of New Brunswick (2004). This study was performed concurrently with the related audit projects undertaken by the commissioner of the environment and sustainable development and the Auditor General of British Columbia. It focused on the key risks associated with the salmon aquaculture industry in New Brunswick which could potentially have a negative impact on the sustainability of salmon cage culture operations and the extent to which those risks were being managed.

The objective was to determine whether New Brunswick programs ensured that New Brunswick salmon cage culture operations were economically, environmentally, and socially sustainable.

Response: The commission is not aware of any federal government response to this report.

Auditor General of British Columbia (2005). This study was performed concurrently with the related audit projects undertaken by the commissioner of the environment and sustainable development and the Auditor General of New Brunswick. It examined British Columbia's programs for protecting and restoring salmon habitat and for preventing and mitigating the potential impact of salmon aquaculture on wild salmon stocks. The examination concentrated on the five main species of wild salmon and focused on the four core ministries and two agencies responsible for habitat and fish protection, as well as for land and resource management as it affected wild salmon.

The purpose of the audit was to assess whether the provincial government had effective programs in place to ensure the sustainability of wild salmon in British Columbia.

Response: The commission is not aware of any federal government response to this report.

Williams (2005). During the 2004 Fraser River sockeye run, an estimated 1.3 million fish were unaccounted for. When DFO found no conclusive explanation for this phenomenon, the minister appointed an independent committee, chaired by former BC Supreme Court Chief Justice Bryan Williams, QC, to evaluate the performance of the southern BC salmon fisheries and provide conclusions and recommendations to the minister.

The committee consisted of 15 members of the southern section of the Integrated Harvest Planning Committee, established in 2002. The members, appointed by the minister, represented commercial fishers, First Nations fisheries, recreational fishers, the Marine Conservation Caucus, and the Province of British Columbia.

The committee's terms of reference described the scope of the committee's mandate as follows:

> It will assess the extent to which objectives were met; identify key factors which constrained performance; and provide recommendations to overcome constraints and guide future management. In particular the review will focus on pre-season planning and the adequacy of consultation processes; establishment of conservation objectives; application of risk management principles; adequacy and timeliness of in-season data; in-season processes for decision making; and enforcement and compliance measures.

The committee was instructed to

- evaluate the performance of each fishery (or group of fisheries) included in the southern integrated fisheries management plan, addressing such questions as whether the pre-season planning process was adequate, whether in-season data required for management were timely and accurate, and what could be done to improve pre-season planning and in-season management; and
- examine the conduct of the Fraser River sockeye fishery in 2004, including an assessment of conservation objectives, scientific advice and risk management strategies, in-season management and consultation processes, and enforcement.

The committee identified four issues relating to the Fraser River sockeye salmon fishery in 2004 that would require careful analysis:

- high temperature of the Fraser River;
- accuracy of the count either at Mission or in the spawning grounds;

- illegal fishing and unreported catch from legal fisheries; and
- adequacy of management of the fishery by DFO.

The committee was unable to complete its review of the entire South Coast within the time allotted. Accordingly, this report (Part One) dealt only with the Fraser River sockeye run. Part Two of the committee's report, dealing with other species of South Coast salmon, was never completed.

Response: *Building Capacity and Trust: Response by Fisheries and Oceans Canada to the 2004 Southern Salmon Fishery Post-Season Review – Fraser River Sockeye Report*, June 2005.

Standing Committee (2005). According to the Standing Committee on Fisheries and Oceans, preliminary escapement estimates for Fraser River sockeye in 2004 suggested a major ecological disaster was unfolding:

- Of the 182,000 Early Stuart sockeye that were counted at the Mission hydroacoustic station, only 9,244 arrived at the spawning grounds.
- The total Fraser River sockeye run reported that only 530,000 spawners arrived in 2004, as compared to 2,353,000 in 2000, the year of the parental spawners.
- Based on these tragically low spawning numbers, there would probably not be enough sockeye salmon to support commercial, recreational, or Aboriginal fishing in the Fraser River in 2008.
- Run sizes for this four-year cycle of Fraser River sockeye salmon were unlikely to return to 2004 levels until at least 2020.

In December 2004, the committee travelled to British Columbia, where it held three days of hearings and met with representatives of the auditors general of Canada and British Columbia, commercial and recreational fishing sectors, unions, First Nations, the Pacific Salmon Commission, the Pacific Fisheries Resources Conservation Council, scientists, and officials from the RCMP and DFO.

Response: *Government Response to the 2nd Report of the Standing Committee on Fisheries and Oceans entitled: Here We Go Again ... Or the 2004 Fraser River Salmon Fishery*, March 2005.

David Suzuki Foundation (2005). The foundation retained three consultants to undertake research into DFO's performance in implementing its conservation mandate in the Pacific Region. DFO's conservation responsibilities include

conservation of populations, stocks, and species (fish, marine mammals, invertebrates, and marine plants); habitat (freshwater fish habitat and marine ecosystems); and fisheries. The overall approach was to analyze DFO's performance against mandated direction for conservation, using case studies and examples that demonstrate effectiveness and challenges. The main sources of information were websites, literature, DFO budgetary records, advice from a group of experts in an interactive panel, and interviews.

Response: The commission is not aware of any federal government response to this report.

BC Special Committee on Sustainable Aquaculture (2007). In November 2005, the Legislative Assembly appointed an all-party Special Committee on Sustainable Aquaculture to examine, inquire into, and make recommendations with respect to sustainable aquaculture in British Columbia, including:

- the economic and environmental impact of the aquaculture industry in British Columbia;
- the economic impact of aquaculture on British Columbia's coastal and isolated communities;
- sustainable options for aquaculture in British Columbia that balance economic goals with environmental imperatives, focusing on the interaction of aquaculture, wild fish, and the marine environment; and
- British Columbia's regulatory regime as it compares to other jurisdictions.

The special committee heard from 275 individuals and organizations at 21 public meetings and received 814 written submissions. Committee members visited 16 aquaculture-related sites, which included salmon farms, closed containment and manufacturing facilities, processing facilities, research facilities, and shellfish facilities. Its members also toured the Broughton Archipelago. The committee made 52 recommendations. It concluded that

> British Columbia has a unique opportunity to protect and enhance our wild salmon populations and marine ecosystems while developing a thriving, innovative aquaculture industry. If the finfish aquaculture industry is to expand and prosper it must minimize its impact on wild salmon and ecosystems. … In all cases First Nations with cultural knowledge of the areas must be fully involved and capacity provided to ensure this can occur.

Response: The commission is not aware of any federal government response to this report.

Fraser (2009). In December 2004, the premier of British Columbia established the independent BC Pacific Salmon Forum, chaired by the Hon. John Fraser, PC, QC, with the following members: John Woodward, Jim Lornie, Teresa Ryan, Christina Burridge, Harry Nyce, Sr., and Jeremy Maynard.

The forum's mandate was to

- develop policy recommendations to protect and enhance the viability of wild salmon stocks and the economic, social, and environmental benefits to British Columbians;
- enhance the economic, social, and environmental sustainability of aquaculture for all coastal communities; and
- increase public confidence in fisheries management generally, and aquaculture in particular, in the marine environment.

Forum members met with more than 200 individuals and groups, attended more than 30 conferences and workshops, and made 10 presentations. The forum worked with more than 80 researchers from a variety of research institutions, scientific disciplines, and perspectives; hosted nine research meetings; and funded more than 35 individual research projects, in addition to technical reviews and reports. The forum received scientific support from a multidisciplinary science advisory committee.

Response: The commission is not aware of any federal government response to this report.

Commissioner of the Environment and Sustainable Development (2009). This audit examined how the Department of Fisheries and Oceans and Environment Canada carried out their respective responsibilities for fish habitat protection and pollution prevention under the *Fisheries Act*, with particular attention to the Habitat Policy and the Compliance and Enforcement Policy. The audit also looked at the two departments' arrangements with others, such as provinces and stakeholders, that supported the administration and enforcement of these provisions. The audit focused mainly on fish habitat in fresh water and estuaries, rather than the marine environment.

Response: The government's response was contained within the commissioner's report.

Pacific Fisheries Resource Conservation Council (2010). Since the council was established in 1998, its mandate has been to provide public information and offer strategic advice to federal and provincial ministers responsible for protecting and sustaining wild salmon and steelhead stocks and habitats. The council has published 69 scientific, technical, and policy reports, advisories, and other papers. Its 2010 report draws from all of those reports to present summaries and compilations of the several themes, findings, and recommendations.

Response: The commission is not aware of any federal government response to this report.

Recommendations of the reports, and the government's responses

The examinations, investigations, and reports discussed in this interim report have resulted in more than 700 recommendations being made respecting the Pacific fishery. Most of those recommendations were directed at DFO, focusing on its management of the fishery and its legislative powers respecting harvesting, protection of habitat, protection of wild salmon stocks, and aquaculture.

In this section, I will summarize those recommendations that are most germane to the mandate of this commission of inquiry – the causes of the decline in numbers of Fraser River sockeye salmon. Where the Government of Canada, DFO, or the minister of fisheries and oceans formally responded to those recommendations, I will summarize those responses.

Organization and administration

Legislative framework and departmental mandate

In 1982, Dr. Peter Pearse made several policy reform recommendations, including that the *Fisheries Act* should be repealed and replaced by a modern, lucid statute containing the main principles of fisheries policy for Canada. The new Act should

- include a clear statement of national fisheries policy objectives;
- set out the management responsibilities and planning procedures for DFO in a sufficiently broad scope to leave no doubt about its mandate to manage fisheries and fleet development effectively;
- commit DFO to integrated resource management and planning, setting out the arrangements for dealing with projects and developments that affect fish habitat;
- devote a separate part to Pacific fisheries, consistent with the national policy framework;

- set out the legal authority and procedures to be followed in allocating sport, commercial, and Indian fishing rights;
- provide for the appointment of a Pacific Fisheries Council and create a Pacific Fisheries Licensing Board;
- formally delegate decision-making authority to the licensing board and, where appropriate, to regional officials in DFO; and
- include a clear and consistent structure of penalties.

Dr. Pearse also recommended that a temporary minister of state for Pacific fisheries, junior to the minister of fisheries and oceans, be appointed and given responsibility for implementing reforms in Pacific fisheries policy. A full-time policy and planning group within DFO's Pacific Region should assist the temporary minister of state in implementing policy reforms. Also, new Pacific fisheries regulations should be passed under the new Act, containing administrative detail ancillary to the Act and policies that must be adjusted quickly in response to changing conservation and management needs.

Response: The government agreed in 1983 to streamline the body of regulations governing the Pacific fisheries, but decided to delay implementation, pending reform of licensing policy. In 1984, cabinet approved the following policy objectives for the Pacific fishery:

- conserve, protect, and develop the fisheries resource and its habitat, so the various objectives for the use of the fishery can be achieved;
- create a policy environment to support an economically viable, self-sustaining West Coast fishery and protect Native participation in this fishery;
- maintain an equitable share of the common resource for the Native food fishery and the regionally important recreational fishery; and
- introduce a licensing and/or royalty framework that places a reasonable part of the cost on those who benefit from the fishery.

In 2001, the Leggatt Inquiry into Salmon Farming in British Columbia agreed with witnesses who maintain that DFO's promotion and support of aquaculture conflicts with its responsibility to protect wild salmon stocks. This inquiry also agreed that the department must adopt a precautionary approach and give priority to wild salmon stocks, free of the conflicting responsibility of promoting the salmon-farming industry. It recommended that

- responsibility for promotion of aquaculture be removed from DFO; and
- government regulators increase monitoring and regulation of salmon farming.

In 2007, the BC Special Committee on Sustainable Aquaculture concluded that British Columbia has a unique opportunity to protect and enhance its wild salmon populations and marine ecosystems while developing a thriving and innovative aquaculture industry. With respect to the regulatory regime, the special committee recommended that there must be a clear division between the Ministry of Agriculture and Lands and the Ministry of Environment. Programs that promote aquaculture development should be within the Ministry of Agriculture and Lands. All protection, regulation, and monitoring of the aquaculture industry must be within the mandate of the Ministry of Environment.

Departmental structure, management, and budget

In 1982, Dr. Peter Pearse made several recommendations respecting administration, including the following:

- The office of the assistant deputy minister for the Pacific Region should be located in Ottawa.
- The staffing and financial resources provided to the Pacific Region relative to other regions, and to the Ottawa headquarters of DFO, should be thoroughly assessed in the context of a financial and administrative review of the department.
- An associate director general should be appointed to assist the director general of the region, especially in regard to internal operations and administration.
- The government should initiate a thorough zero-base review of the administration, staffing, and financial support for each program of the entire department.
- DFO should designate a policy and planning group, consisting of senior officers, with specific responsibility for strategic long-range planning for fisheries management and administration in the region.

Response: In 1983, the government agreed that a policy and planning group should be created in DFO's Pacific Region, charged specifically with the overall coordination of all policy development activities in this region. Such a policy and planning group was subsequently established. It also agreed that an administrative and financial review of DFO in the Pacific Region should be undertaken.

In 1998, the Standing Committee on Fisheries and Oceans made several recommendations respecting the management of DFO, including the following:

- The government should completely restructure the department in order to manage the fishery resource at source, including relocating all but a small number of ministerial staff to the regions.

Response: DFO stated that some restructuring had occurred, and the department was becoming a more geographically based field organization, designed to be more responsive to the concerns of local communities. Only 11 percent of departmental employees were located in Ottawa, while 23 percent worked in the Pacific Region. Moreover, "the development of resource management plans takes place in regions and in most cases, fishing plans are approved in the regions."

- DFO should include stakeholders and the provinces as active participants in the management of the fishery.
  Response: DFO recognized that improved consultation processes are essential to responding to public expectations and maintaining confidence. It had created an open decision-making process with more public participation, involvement, and co-operative management on the part of all sectors / stakeholders. As examples of specific action, DFO cited implementation of the Pacific Fisheries Resource Conservation Council and increased stakeholder participation in the Pacific Science Advice Review Committee.
- DFO should undertake a complete review of its processes for formulating fisheries policy and for consultation, in order to rebuild the lost trust between the government and the fishing community.
  Response: DFO agreed that improving its processes for formulating policy and for consultation was necessary to rebuild lost trust. To that end, the minister released a major policy statement in October 1998 entitled *A New Direction for Canada's Pacific Salmon Fisheries* (which outlined 12 principles to guide the policy for fisheries management in the future), as well as a discussion paper in December 1998 entitled "An Allocation Framework for Pacific Salmon, 1999–2005."
- DFO's scientific arm must be better funded and must have autonomy from the government to eliminate political interference.
  Response: DFO recognized the importance of funding for science and was considering several options, including finding new sources of funding, obtaining information from industry and stakeholders, and working in co-operation with users of the fishery resource. In support of sound and timely advice based on the most complete scientific information possible, DFO has structured peer-review processes that make information available to the public through the Pacific Science Advice Review Committee. In addition, the Pacific Fisheries Resource Conservation Council provides a vehicle for public discussion of information on the status of fishery stock and acts as an open and transparent agency for scientific information that is important for conservation of the resource.

In 1999, the Auditor General of Canada reported that there was a gap between DFO's high-level policy commitments to sustainable development, biodiversity conservation, and stakeholder partnerships and its ability to meet those commitments. The regional office's dilemma was that it was putting a significant amount of money into managing the Pacific salmon commercial fishery ($85 million for 1998–99, including habitat, enhancement, science, and salmon management) for a declining economic return. The auditor general recommended that, as a basis for setting priorities in the allocation of resources to meet the demands of the New Direction policy, DFO should complete risk assessments in areas where management information is incomplete or lacking.

Response: DFO agreed. The salmon assessment frameworks being prepared will be critical to identifying priorities. In addition, DFO will be initiating a review of the salmon management process. Resources, from budget, reallocation, and other sources, would be directed according to priority.

In 2003, the House of Commons Standing Committee on Fisheries and Oceans recommended that funding be restored to DFO at levels adequate to the tasks of "restoring science and enforcement programs critical to the conservation of the resource, habitat protection, enhancement and recruitment of professional fisheries managers and prosecution of commercial and recreational fisheries."

Response: The government recognized the importance of science and enforcement in supporting conservation and fisheries management. However, it has limited funding and must set priorities. DFO is reviewing budget allocations and programs throughout the department to ensure that resources are allocated to the highest-priority activities and that they are managed effectively.

In 2005, the Williams Southern Salmon Fishery Post-Season Review Committee concluded that clear deficiencies in management structure and budgeting process at DFO had contributed to the 1.3 million "missing salmon" in 2004. It heard that administrative responsibilities had grown over recent years: for example, Coast Guard, oceans management, aquaculture management, *Species at Risk Act*, recognition of Aboriginal rights under the *Constitution Act, 1982*, climate change, growth in recreational demand, and increasing habitat pressures. Budget increases over the previous seven years, from $125 million to $150 million, had all been used for office staff and additional layers of bureaucracy, with no new funding for operating and/or capital expenditures. The goal of managing fisheries and the resource to ensure sustainability and best use had shifted in recent

years to attempts to satisfy the demands of a host of stakeholders by developing policies and processes for public input. In terms of organization within DFO, the broad array of divisions with separate responsibilities and a variety of reporting relationships bred problems. Although attempts to involve stakeholders in planning and decision making appeared to result in more co-operation, their net effectiveness in delivering DFO's core mandate was less clear. The committee recommended that

- DFO should hire an independent consultant to provide guidance to senior management during the Pacific Region's reassessment of its core mandate with respect to management of Fraser River sockeye salmon and on devising a management organizational structure that best supports that mandate.
- Although public involvement is a "good thing," ultimately the public expects DFO to maintain responsibility for successful resource management. Collaborative approaches and consultation should be evaluated against the goals set for fisheries management, and should be compared with the costs and benefits of in-house or independent delivery of programs.
- DFO has insufficient resources to meet its core mandate for developing, managing, and controlling Fraser River sockeye salmon fisheries and for conserving the resource. It should make a submission for more funds, and an appropriate outside agency should undertake an objective examination of the region's financial situation.
- The Canadian consultative and management structures for all fisheries that have an impact on Fraser River sockeye salmon should be integrated with the Canadian section of the Fraser River Panel of the Pacific Salmon Commission. In addition, the Canadian chair of the Fraser River Panel should be the senior authority on all fisheries management decisions relating to Fraser River sockeye throughout the South Coast and should be empowered to make those decisions on a timely basis.

Response: DFO disagreed with the recommendation that it reassess its core mandate respecting management of Fraser River sockeye salmon. Although it would be open to reviewing its organizational structure, any review would have to consider the full scope of the department's mandate. DFO agreed with the suggestion that integrated management plans should be developed. It develops annual integrated fisheries management plans within a framework that sets measurable goals, analyzes options, and evaluates results. The newly formed salmon Integrated Harvest Planning committees should assist in bringing some additional rigour as well as consensus-based public input and accountability to developing fishery management plans, the evaluation of those plans post-season, and the provision of advice for future improvements.

Over the medium to long term, DFO envisioned that consultation and public advice forums will provide for comprehensive shared decision making and full co-management of the resource, recognizing that the

minister retains the final authority. In 2004, the department established the Integrated Harvest Planning Committee to provide formal advice and to make recommendations on operational decisions related to salmon harvesting. This input is part of the process to establish a more streamlined and representative cross-sectoral advisory process for harvest planning, management, and post-season review.

DFO agreed that there is a need to provide additional resources for some key programs, including fisheries enforcement, catch monitoring, and salmon stock assessment. In 2005, additional resources will be provided to improve all these programs on the Fraser River. However, it must be understood that the public expectation for providing resources will always be greater than government's ability to deliver. Thus, long-term funding mechanisms must include the development of strong and durable partnership arrangements with outside agencies such as the Pacific Endowment Fund, the Pacific Salmon Foundation, and the Fraser Basin Council.

The Williams Post-Season Review Committee also observed that its was the fourth review in 12 years of the management of the Fraser River sockeye salmon. Four broadly recurring themes – enforcement; management and accountability; information and communications; and environmental conditions – had led to 96 recommendations. The committee recommended that DFO form a cross-sectoral committee to produce a work plan for addressing the completeness of responses to past recommendations and for responding to "new" recommendations contained in the current review.

Response: DFO disagreed, stating that the current review determined that it had responded to most of the recommendations. The review provided a thorough assessment of Fraser River sockeye salmon issues in 2004 and a solid basis from which to move forward. It highlighted challenges such as mixed-stock fishery complexities, competing stakeholder aspirations, environmental deterioration, diminishing budgets, information and communication challenges, and changing demographics as core issues. Fundamental reforms had been identified to resolve the problems underlying the circumstances of the 2004 Fraser sockeye fishery. The minister's April 14, 2005, announcement of Pacific fisheries reform already laid out a strategy to guide the work that was required. In addition, extensive work was identified to resolve longstanding conflicts between First Nations and non-Aboriginal interests. DFO agreed that new institutional arrangements should be considered to address the serious relationship issues that had been identified.

In 2005, the Standing Committee on Fisheries and Oceans recommended that the Government of Canada mandate an independent body to review the reports that

had been written over the preceding 12 years about the management of the Fraser River sockeye salmon fishery and to determine which recommendations had been, or should be, effectively implemented.

Response: DFO did not agree, noting that the 2004 Williams Post-Season Review Committee had reviewed these earlier reports: "The Williams report notes that DFO has responded to most of the recommendations of the earlier reviews (i.e., 1994 and 2002)." It added that the reports of both Mr. Williams's committee and the standing committee provided a thorough assessment of the 2004 Fraser River sockeye salmon issues, along with a solid basis from which to move forward with required changes. The minister's April 14, 2005, announcement of Pacific fisheries reform would lay out a strategy for the fundamental changes that were required to get to the root causes of problems in the salmon fishery.

In 2010, the Pacific Fisheries Resource Conservation Council stated:

> 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.

Co-management and advisory processes

In 1982, Dr. Peter Pearse made a series of recommendations respecting consultative arrangements. Among them was the recommendation that DFO articulate general policy and procedures for effective consultation with the interested public, including the following:

- A consultative or advisory body should be appointed to deal with each branch of fisheries policy in which there is a distinct and focused public interest.
- Each consultative body should have clear, written terms of reference to govern its deliberations and a specified line of reporting and accountability.
- Members of consultative bodies should be formally appointed by the minister or an official delegated by the minister for specific terms. They should be reimbursed for the expenses they incur in participating in meetings.

- The membership of any consultative body intended to provide advice on policies that require balancing conflicting interests should not include delegates who are answerable to the interested groups.
- The government should replace the existing Minister's Advisory Council with a new Pacific Fisheries Council. The council should be provided for in legislation, and its terms of reference should embrace all matters that fall within the responsibility of the minister as they relate to Pacific fisheries. The council should be empowered to consider industrial policies, international arrangements, or other questions when they are referred to it by the minister.
- A special advisory committee should be appointed for each of the significant fisheries that have special regulatory policies, including mariculture, the sport and Indian fisheries, and the separately licensed commercial fisheries. These committees' terms of reference should direct their attention to the coast-wide problems of managing specific fisheries. Members should be appointed by the minister or the director general for definite terms, drawing on representatives of organized groups.
- Three regional fisheries conservation committees should be appointed, one each for the north, south, and Fraser River administrative areas. These committees' terms of reference should direct their attention to matters relating to enhancement and habitat management in the relevant area.
- Local advisory committees should be appointed to deal with special fisheries' habitat or management problems in particular areas where these problems cannot be adequately dealt with by the fisheries advisory committees or the fisheries conservation committees. These committees' terms of reference should be defined geographically as well as with respect to the specific problems to be considered. Committee members should be appointed by the minister, director general, or area manager for definite terms, drawing on representatives of local interest groups.

Response: In 1983, the government agreed with the need to reorganize the consultative process – details were already under discussion with interested parties. The government also agreed with the need to create a new and vigorous public information program. In 1984, the government announced that, starting in 1985, DFO would establish area committees to advise and consult on fisheries management and other matters of common concern to fishers. With the establishment of the Pacific Salmon Commission in 1985, expert panels would provide recommendations and comment on the management of the fisheries in their areas of responsibility before and after each season's harvest. In 1987, the Pacific Regional Council was established to replace the former Minister's Advisory Council. The new council's mandate was to provide the minister with policy advice on major long-term issues affecting the BC fishery.

Dr. Pearse also made recommendations respecting federal arrangements with British Columbia, including the following:

- The Government of Canada should invite the Government of British Columbia to join in a comprehensive intergovernmental agreement on fisheries matters. It should comprise a master or framework agreement providing for supplementary agreements on matters such as a renewed Salmonid Enhancement Program, an inventory of aquatic habitats, co-operative arrangements for habitat management and pollution control, provincial responsibilities in administering and regulating freshwater fisheries, and division of administrative responsibilities for mariculture and the gathering of statistical data on marine fisheries.
- The Government of Canada should invite the Government of British Columbia to co-operate in establishing a Canada–British Columbia Fisheries Committee, consisting of the deputy ministers responsible for fisheries in the two governments and other members mutually agreed upon. The committee's responsibility would be to assist the two governments in negotiating an intergovernmental agreement, to coordinate and oversee the implementation of the agreement, and to provide for consultations on other fisheries matters of mutual interest.

Response: In 1983, the government announced that discussions with British Columbia would be initiated following cabinet approval of negotiating strategies. In 1986, DFO and the BC Ministry of Environment signed a memorandum of understanding on the coordination of fisheries programs under the General Fisheries Agreement. This memorandum was intended to facilitate co-operation and coordination in the planning and application of fisheries resources management policies and programs in British Columbia.

In 1999, the Auditor General of Canada reported that, although DFO saw consultation as a first step toward a closer working relationship with its stakeholders, leading eventually to co-management through regional boards, stakeholders continued to complain about its actual consultation processes. DFO recognized the need for a fundamental review and revision of its present approach to public involvement in the management of salmon fisheries. The auditor general recommended that DFO should

- evaluate its consultation process, with the input of stakeholders, to identify where improvements are needed before it finalizes its improved decision-making policy;
  Response: Consistent with this recommendation, DFO was planning to obtain stakeholders' and public input on how to improve the consultative process before finalizing the improved decision-making policy.
- intensify its efforts to develop common objectives and integrated strategies with the Province of British Columbia to conserve the resource base and promote sustainable fisheries.

Response: Over the preceding two years, the federal and provincial governments had been jointly implementing the Canada–British Columbia Agreement on the Management of Pacific Salmon Fishery Issues. Additional work on coordinating their efforts in both enforcement and habitat management and restoration was under way.

In 2001, the University of Victoria's Institute for Dispute Resolution made numerous recommendations respecting DFO's consultation and decision-making processes, including the following:

- improve standards of practice within consultation processes and commit to a set of principles and a code of conduct that address fundamental issues of mistrust; and
- establish a planning and policy development system that clarifies when and how important decisions are made and how interested parties may participate.

The institute recommended that all parties commit to a code of conduct for inclusive, transparent, and accountable participation processes. It provided an initial code of conduct based on principles for an effective representation process and for its implementation.

Response: There was no formal, immediate response to the institute's report. According to DFO's Recommendations and Responses, the department published a national *Consultation Toolbox* and *Consultation Framework* in 2004 that includes guiding principles and approaches to developing trust through effective engagement. In the same year, DFO's Pacific Region developed a Policy to Govern Pacific Region Advisory Bodies, including a set of principles and a code of conduct for advisory groups, which contains many of the recommendations in the institute's report. DFO established a consultation secretariat while the independent review was in progress to coordinate and support regional departmental consultation on a wide range of policy issues.

In 2003, the Chamut External Steering Committee noted widespread concern about inadequate consultation respecting management of the Pacific salmon fisheries, including pre-season development of the Integrated Fisheries Management Plan and the in-season management of the fishery. It recommended that, to facilitate improved and transparent consultation, new advisory processes be developed by

the fall of 2003 for the provision of advice on policy issues and harvest planning.

- A policy steering committee should be established that represents the full range of interests for the conservation and management of Pacific fisheries resources: First Nations, commercial and recreational fishing sectors, conservation organizations, community groups, and the provincial government. This committee would provide a venue for broadly based dialogue with DFO on major policy matters affecting the fishery, including a Wild Salmon Policy, risk management, and socio-economic objectives.
- Two new salmon-harvest planning committees (north and south) should be established to provide advice to DFO on the development of integrated fisheries management plans.

Response: DFO stated that a draft action plan and decision note were prepared in September 2003, but, after the Regional Policy Branch assessed regional policy gaps, it was determined that the structure necessary to deal with high-level policy gaps might benefit from a different approach from that recommended by the external steering committee. A revised decision note detailing a policy forum process that would occur on an as-required basis would be prepared, leading to subsequent implementation. DFO reported that steps were under way for stakeholders to designate representatives to the Integrated Harvest Planning Committee.

The Chamut External Steering Committee also recommended the following with respect to Fraser River First Nations:

- The Fraser River First Nations watershed process should be further supported by ensuring that technical support is provided for continued improvements in the efficiency of annual management planning and consultation processes.
- Support should be provided to coastal First Nations who choose to form an aggregate body representing First Nations communities.

Response: DFO responded that the watershed process was supported through the Fraser River Aboriginal Fisheries Secretariat, for which the department provided funding and technical support. In addition, coastal First Nations had formed a society with the initial focus of conducting successful co-operative food, social, and ceremonial fisheries in a manner consistent with the purse-seine test fisheries.

In 2004, Dr. Peter Pearse and Prof. Donald McRae noted that, during the past decade, the adoption of individual quotas in some fisheries had led to a significant move toward co-operative management. Engaging those who hold the rights to harvest fish in the management of their fisheries was seen as the most promising trend, one that

should be developed further by strengthening the role of various fisheries associations. They recommended:

- The minister of fisheries and oceans should issue a policy statement declaring that the government supports co-management as a means of improving the management of fisheries.
- DFO should issue clear instructions about procedures for establishing fisheries associations.
- Membership in a fisheries association should be required of anyone participating in a particular commercial fishery, and associations should be authorized to levy fees on their members to cover the cost of their work.
- Co-management arrangements should be firmly established in law.

Accountability to Parliament

In 2003, the House of Commons Standing Committee on Fisheries and Oceans recommended that DFO should report annually to the standing committee on the progress made in dealing with the issues and problems raised concerning the Fraser River salmon fishery and that the report also be tabled in Parliament.

Response: The government stated that it would be inappropriate to select only the Fraser River salmon fishery for a report to Parliament, given that it implements 175 fishing plans each year and that the Fraser River salmon fishery (which is only one of many components of the West Coast salmon fisheries) is managed under the Canada–US Pacific Salmon Treaty. DFO already provided extensive information through its annual Integrated Fisheries Management Plan, which includes a post-season review section that describes the conduct of the fishery in the context of all the objectives that were identified the previous year.

Independent oversight

In 1995, the John Fraser Sockeye Public Review Board concluded that the objective of sustainable fisheries management would be advanced by the creation of an independent body to act as a public watchdog agency, with no vested interest except the health of the fish and their habitats. It recommended the establishment of a Pacific Fisheries Conservation Council, which would report to ministers and the public annually and from time to time as appropriate.

Response: DFO responded that it supported the concept and would explore it in the imminent roundtable process examining fleet capacity reduction and allocation issues.

In 1996, the Federal-Provincial Review of the Mifflin Plan, a comprehensive plan by the minister of fisheries and oceans to revitalize the West Coast commercial salmon fishery, recommended action on the suggestion that was made in the 1994 Fraser River Sockeye Public Review Board report: that a Regional Conservation Council be established to act as a public watchdog for the fishery.

Response: In 1998, the minister of fisheries and oceans created the Pacific Fisheries Resource Conservation Council, with a mandate to

- provide strategic advice regarding stock conservation and enhancement; habitat restoration, protection, and improvement; and fisheries conservation objectives (including identifying stocks in need of conservation actions and stocks where there was insufficient information to assess their conservation status);
- 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 related to conservation of Pacific salmon and their freshwater and ocean habitat;
- integrate scientific information with the knowledge and experience of First Nations, stakeholders, and other parties;
- alert the minister of fisheries and oceans and the public on issues that threaten the achievement of departmentally defined conservation objectives for Pacific fish populations or their freshwater or ocean habitat; and
- 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.

Pacific Salmon Treaty

In 1998, the Standing Committee of Fisheries and Oceans recommended that the government take immediate actions against the United States in order to preserve depleted coho salmon stocks and to facilitate a Pacific Salmon Treaty resolution.

Response: DFO responded that Canada's goal is to arrive at a long-term arrangement with the United States that addresses conservation concerns and encourages collaboration to protect threatened salmon stocks. Before the 1998 season, in order to advance conservation of weak sockeye runs, Canada succeeded in concluding fishing arrangements with the United States which capped the US harvest of Fraser sockeye and delayed the start of US fishing from early July until later.

Habitat management, conservation, restoration, and enhancement

In 1982, Dr. Peter Pearse made 23 recommendations for habitat management, including the following:

- The Government of Canada should invite the Government of British Columbia to participate in a joint program aimed at compiling a comprehensive inventory of fish habitats in freshwater streams and estuaries in the province. The inventory should describe the biophysical characteristics of individual areas of fish habitat and include an assessment of their potential for producing fish.
- The policy of DFO should be to ensure that the total fish production capacity in the region will not be diminished as a result of industrial and other activities that impinge on fish habitat. Identifiable and measurable harm to fish habitat should be tolerated for any particular development only if the damage is fully compensated through expanded fish production capacity elsewhere.
- DFO should adopt an explicit policy for assessing proposed developments that threaten fish habitat and for determining compensation where required, based on the following precepts:
    - In considering proposals for new developments, DFO should investigate their impact on fish habitat and all feasible means of avoiding or minimizing harm to fish.
    - Developers should be required to adopt all reasonable measures to avoid or to mitigate damage to fish habitat.
    - If such measures are insufficient to prevent habitat damage, DFO should be authorized (but not required) to approve the development, but only if the loss in fish production capacity is fully compensated through increased fish production capacity elsewhere. The compensation should take the form of new fish production by the developer or cash equivalent to enable DFO to replace the equivalent of the lost productive capacity. Cash compensation should be placed into a new Pacific fisheries conservation fund, to be administered by DFO. Money paid into the fund should be spent only on habitat improvement and other fish production measures.
- If it is deemed to be in the public interest to exempt any development proposal from the provisions for mitigation and compensation in respect of damage to fish habitat, the decision should be made by the federal cabinet, not by DFO.
- The minister (or delegate) should have the explicit authority to convene public hearings concerning any proposed project or development that might threaten fish habitat.
- DFO should develop, in co-operation with the province, a program to ensure systematic monitoring of all industrial and other operations in the Pacific Region which have the potential for inflicting significant damage to fish habitat.

- Before charges are laid under the habitat protection provisions of the *Fisheries Act*, the circumstances should be reviewed by senior regional officers of DFO, including the director general, the director of the Habitat Management Branch, and the chief of enforcement, to ensure consistency in applying the law.
- DFO should produce operating guidelines to assist industrial operators in avoiding damage to fish habitat; before any charges are laid, the extent to which such guidelines have been adhered to should be considered.
- Exclusive administrative responsibility over all habitat protection provisions in the *Fisheries Act* and over the *Ocean Dumping Control Act* in the Pacific Region should be assigned to DFO, together with related staff and funds.

Response: In 1983, the government agreed that habitat protection operations should be strengthened and stated that several of Dr. Pearse's other recommendations were under review. In 1984, DFO and British Columbia's Ministry of Environment, Lands and Parks jointly launched the Fish Habitat Inventory and Information Program, the primary goal of which was to compile a comprehensive inventory of the quality, quantity, and productive capability of fish habitats in the freshwater, estuarine, and marine environments of British Columbia. In 1986, the minister presented to Parliament DFO's Policy for the Management of Fish Habitat.

Dr. Peter Pearse made 13 recommendations respecting salmonid enhancement, including the following:

- The Salmonid Enhancement Program should proceed with planned projects, according to its established priorities.
- A concerted effort should be devoted to monitoring and comprehensively evaluating the results of projects already in place. Careful attention should be paid in these evaluations to the implications of enhanced stocks for fisheries management.
- Planning for future enhancement should proceed, with appropriate funding, for the next two years as determined with the advice of the Salmonid Enhancement Board.
- Priorities for future enhancement should be linked to the emerging results of current projects as revealed by careful monitoring and evaluation. Major projects of a kind that have yet to prove themselves or that depend on uncertain information raise problems of mixed fishing and manageability, and they should be postponed until these questions are resolved. Correspondingly higher priority should be accorded to well-proven techniques, smaller and less risky projects, and works based on relatively solid information.
- Artificial enhancement projects should be approved only if investigation reveals that equivalent net gains cannot be achieved through improved fisheries management or reduced fishing pressure.

Response: According to DFO's Recommendations and Responses, the government agreed in 1983 to continue the Salmonid Enhancement Program, initially at a modest level. In 1984, DFO announced new funding of $44 million to carry the program through a two-year transition phase. In 1986, the minister of fisheries and oceans announced cabinet approval of additional funding of $20 million to enable the program to operate fully in 1986–87. In 1987, additional funding of $208 million over the next five years was announced.

In 1995, the John Fraser Sockeye Public Review Board made a series of recommendations on environmental issues, including the following:

- DFO should urge the Greater Vancouver Regional District and the Province of British Columbia to install, without further delay, a secondary sewage treatment facility at Annacis Island.
  Response: DFO not only agreed but included the Lulu Island facility as well.
- DFO should develop a predictive water temperature model for the Fraser River and its major sockeye tributaries, and the resulting information should be used for in-season risk-aversion management.
  Response: The model under development would be implemented by 1996. Temperature probes were in place throughout the Fraser basin and would provide data in real time. Criteria would be developed to adjust in-season fishing plans during periods of severe environmental conditions.
- Federal, provincial, and local governments should join forces to develop effective policies and plans in the Fraser River basin designed to
  - better treat and control the discharge of effluent into the Fraser River watershed;
  - see to the implementation of responsible forestry practices in line with the new provincial Forest Practices Code;
  - continue to remove in-river obstacles that impede the migration and spawning of anadromous species; and
  - regulate urban development in the Fraser River watershed so as to be compatible with environmental priorities.

  Response: DFO responded: "The Fraser Basin Management Board already brings federal, provincial, Aboriginal and local governments together and will be encouraged, hopefully with the support of the BC Minister, to focus on this recommendation."
- DFO should conduct further research on a variety of issues.
  Response: Research was currently under way on the effect of logging on water temperature and the effects of multiple sublethal stresses on migrating salmon. Research would be undertaken on ways to mitigate adverse water temperatures and to improve survival at all stages in the life span. In order to

improve pre-season forecasting, additional work would also be done on the Johnstone Strait diversion rate.

In 1997, the Auditor General of Canada examined DFO's activities in conserving the Pacific salmon habitat. The auditor general reported that the Policy for the Management of Fish Habitat (1986) established a "net gain" objective – increasing the amount of habitat available to salmon by conserving existing habitat, restoring damaged habitat, and, where possible, developing new habitat. It concluded that DFO had not prepared an overview report on the status of fish habitat conservation in Canada, nor had it yet developed an acceptable, standardized measure of habitat productivity. The auditor general made a series of recommendations, including the following:

- DFO should give the collection and management of information on Pacific salmon stocks and habitat a high priority in order to meet the needs of resource managers in the field and any reporting requirements on the status of the resource.
  Response: DFO would continue to give high priority to the collection and management of information on Pacific salmon stocks and habitat.
- DFO should clarify the extent to which it intends to apply sustainability and genetic diversity practices to the management of individual salmon stocks and their habitats.
  Response: DFO would continue to apply the Policy for the Management of Fish Habitat to the habitat of BC salmon stocks.
- DFO should develop more explicit operational objectives and targets to address sustainability and genetic diversity of salmon stocks for inclusion in fishing plans. The linkage between harvest management and fish production, including enhancement as well as habitat protection, needs to be strengthened.
  Response: The linkage between harvest management and fish production, including enhancement as well as habitat protection, will be strengthened further.

The auditor general also recommended that

- DFO should increase its level of participation in regional and community-based planning initiatives.
- DFO should work with the Province of British Columbia to improve efficiencies in the development referral system, subject to an appropriate accountability framework being put in place to satisfy the department's national mandate for habitat protection.
- In implementing the development referral program, DFO should devote more time and effort to compliance monitoring and follow-up in order to assess the

effects of its habitat management decisions and its performance toward the achievement of "no net loss" of habitat.
- DFO should review the performance of existing co-operative arrangements in British Columbia and build on those models that have produced positive results in habitat conservation.
- Agreements setting up such co-operative arrangements should contain a statement of objectives, a clear definition of roles and responsibilities, expected results and requirements for program coordination, and performance reporting and evaluation.
- DFO should review the effectiveness of its Habitat Policy and Habitat Management Program and develop a strategic approach to guide its negotiation of a new subagreement on habitat conservation and protection with British Columbia.

Response: DFO's single response to the preceding six recommendations stated that it was undertaking an internal review of the Habitat Management Program in the Pacific Region to provide strategic direction for program delivery. This review would be a component of the 1997 Canada–British Columbia Agreement, which was expected to result in a coordinated and balanced habitat management program in British Columbia.

In 1998, the Standing Committee on Fisheries and Oceans was told that all levels of government had failed in their responsibilities to protect and restore the salmon habitat. It recommended that the government review its policies respecting habitat restoration and protection, enforcement, and fish hatcheries and that additional human resources be provided at the local level for habitat restoration.

Response: DFO responded that initiatives under the new *Oceans Act*, such as the oceans strategy, integrated management plans, and marine-protected areas, offered a new and significantly different approach to habitat protection – and that they would be developed and expanded. Since 1996, DFO had funded programs valued at $18 million, and an additional $20 million would be spent over the next three years. Also, DFO would facilitate the development of watershed councils representing all local interests, including those whose activities have an impact on fish habitat. Stewardship coordinators would be recruited to work with the watershed councils, as would habitat auxiliaries to work with industry to promote awareness of habitat issues, in order to avoid damage and to monitor works that may have an impact on habitat. DFO would continue to support habitat restoration work where required, its first priority being to support projects that will help to conserve and rebuild threatened salmon stocks. Some of these projects would offer employment opportunities for displaced fishers. DFO agreed that there was a need to improve its policies

related to fish hatcheries, which would be addressed in its forthcoming Wild Salmon Policy paper.

In 1999, the Auditor General of Canada concluded that, given the need to satisfy conservation requirements while optimizing fishing opportunities, a better understanding of the genetic diversity of stocks is essential. DFO's Pacific Region office indicated that, to protect genetic diversity, it would manage salmon on the basis of Conservation Units – groupings of stocks with related genetic characteristics – similar to those adopted in the United States. The auditor general made several recommendations:

- In order to protect the genetic diversity of salmon stocks, DFO should move quickly to determine Conservation Units for all five species.
  ***Response*:** DFO agreed with the need to continue efforts to determine Conservation Units for Pacific salmon. Work on coho salmon stocks was most advanced at that point, reflecting immediate conservation concerns. Initial plans for Conservation Units for all species were to be completed in priority sequence as quickly as resources permitted, then continually upgraded as new information became available.
- DFO should produce comprehensive, integrated status reports on stocks and habitats based on the new Conservation Units for each salmon species. The report should be updated annually and used in developing, implementing, and evaluating fisheries management plans.
  ***Response*:** DFO agreed that there was a need to improve the integration of information about stock and habitat assessment in order to help guide decisions about fisheries management. This process would be consistent with the ecological approach to fisheries management to which the department is committed and it would be implemented in a staged manner. DFO agreed that integrated reports should be produced on a regular basis, with more frequent reviews in special circumstances, but it questioned whether an annual reporting system provided the appropriate time frame for regular reporting.

In 2003, the Chamut External Steering Committee recommended that DFO conduct consultations on a Wild Salmon Policy with First Nations, harvesters, and other interest groups, including conservation organizations. The policy should provide a framework for defining conservation objectives for naturally spawning salmon and direction for resource management (Conservation Units and reference points), habitat protection, enhancement, and aquaculture.

Response: DFO responded that development of the Wild Salmon Policy had been slowed by internal debate at all levels over several key policy issues, specifically what level of genetic diversity to conserve, the implications of the *Species at Risk Act*, and the development of an open and transparent planning process to consider social, economic, and biological factors. The Wild Salmon Policy was adopted on May 31, 2005.

In 2004, the commissioner of the environment and sustainable development made the following recommendations:

- DFO should finalize the Wild Salmon Policy to define conservation objectives and provide direction for the management of fisheries, protection of habitat, and salmon enhancement.
  Response: DFO responded that it was nearing completion of a draft Wild Salmon Policy. Following regional and national review and approval, the policy would go to consultation and final departmental approval, then be released to the public.
- DFO should collect and analyze information to provide up-to-date assessments on habitat conditions.
  Response: DFO responded that it "collects habitat information in partnership with community groups, the Province of British Columbia, and industry sectors. These assessments are accessible in a variety of ways, including watershed atlases and on-line digital mapping. The assessments will continue and expand as new partnerships are developed."

The commissioner also reported that the overall objective of the 1986 Policy for the Management of Fish Habitat is to achieve an overall net gain or increase in the amount of habitat available to salmon. However, there are indications that habitat loss is continuing and the Habitat Policy does not seem to be working. Until recently, DFO and the Province of British Columbia jointly operated a project referral system under which individuals, companies, or agencies referred land, river, and marine development projects to them for review to determine whether changes to fish habitat were likely to occur. The province now uses a results-based approach to protecting fish habitat, and the department consequently needs to realign its regulatory review efforts toward those projects and areas with the greatest risk to fish habitat. The commissioner recommended that

- DFO coordinate its efforts with the Province of British Columbia, using a risk-based approach that would both complement the provincial approach and satisfy its own mandate to manage and protect fish habitat.

Response: DFO stated that it was implementing a science-based risk management framework that focused on the highest risks to fish habitat. It was expected that the 2000 federal-provincial Agreement on Fish Habitat Management would be renewed and that the governments would collaborate in the development of the new provincial riparian areas regulation that would deal with setback requirements.

In 2005, the Auditor General of British Columbia made several recommendations to help ensure that the province could effectively manage its responsibilities to sustain wild salmon. The auditor general recommended that the province

- develop, in conjunction with DFO, a clear vision (with goals and objectives) for sustaining wild salmon and provide public policy direction about what is an acceptable risk to salmon habitat and what is an acceptable loss of salmon runs;
- develop, in conjunction with DFO, an overarching strategy to manage wild salmon sustainability;
- identify a lead provincial agency to coordinate efforts for sustaining wild salmon and to rationalize the committee structures;
- coordinate a review of the way recent legislative changes have affected wild salmon and examine the outcomes of provisions that are not being put into force;
- ensure that initiatives aimed at preventing impact to salmon habitat incorporate best-management practices along with measurable indicators and results that are linked to appropriate regulations;
- review provincial compliance and enforcement programs within various resource management agencies to ensure that sufficient resources for creating deterrents are maintained and establish a clear policy and decision framework for identifying and approving escalating compliance and enforcement actions;
- ensure that provincial agencies work together to develop methodology and indicators to enable periodic assessment of the effectiveness of legislative provisions for habitat protection in meeting goals to sustain wild salmon;
- institute a program to rank restoration priority, formulate a multi-year restoration program, and determine the effectiveness of restoration programs;
- through the Ministry of Sustainable Resource Management,
    - determine, in conjunction with related provincial agencies and federal partners, consistent data standards for collecting and storing information, including wild salmon data; and
    - ensure that a program is in place to attest the accuracy, completeness of data, and timely accessibility of information for decision makers and users;

- assess the resource requirements needed to deal with wild salmon issues; and
- develop a monitoring system and indicators to measure and report on the overall progress for sustaining wild salmon on a timely basis.

In 2005, the assessment by the David Suzuki Foundation of DFO's performance on its conservation mandate included the following conclusions:

- DFO has inadequate information to carry out its conservation-related responsibilities.
- DFO does not conduct its operations in a transparent manner, nor does it provide enough meaningful and timely information on its conservation performance to its various audiences.
- DFO does not have an adequate budget to carry out its conservation responsibilities effectively.
- Political influence too often interferes with and limits DFO's ability to carry out its conservation responsibilities.
- DFO does not appear to be performing effectively in the many areas where it shares responsibility with other agencies, departments, and levels of government;
- Bureaucratic complexity often limits DFO's ability to carry out its conservation-related responsibilities.
- Conflicting, changing, and expanding mandates and direction create a confused work environment that limits conservation performance.
- In many instances, DFO does not effectively enforce the laws related to conservation.

The foundation stated that implementation of the following general recommendations by DFO Pacific Region would provide the basis for significant improvements in the region's ability to implement its conservation mandate:

- provide clear, quantified, transparent, publicly understandable goals and performance measures, which would be progressively applied, to guide the conservation and management of fish, fish habitat, and fisheries;
- make those who use or have an impact on fish, fish habitat, and fisheries pay for authorization, mitigation, monitoring, and researching their impact;
- adopt, co-operatively with the provincial government, a meaningful zoned fish habitat protection system based on land / water use co-planning that will treat those who make small or large habitat impacts fairly, including moving ahead on marine-protected areas and other fisheries–protected areas;
- document and regularly report, co-operatively with the province, on all planned and inadvertent changes, including reductions or relaxations in requirements for monitoring or enforcement of conservation provisions for fish populations, habitats, or ecosystems;

- establish and adequately fund an arm's length / independent accountability and reporting process to monitor and report on the conservation and management of fish, fish habitat, and fisheries; and
- establish and maintain a coherent and consistent fisheries, habitat, and water-quality enforcement program.

In 2005, the Williams Post-Season Review Committee reviewed studies documenting the negative impact of increased river water temperature on migrating salmon. The committee concluded that high water temperature is an extremely serious problem for Fraser River sockeye, as it may lead to fungal, bacterial, and parasitic infections, delayed migration, increased physiological stress, decrease in energy reserves needed to reach spawning grounds, increased delayed mortality following non-lethal fisheries encounters, and direct mortality. The committee made several recommendations:

- The accumulation of degrees of water temperature encountered per day (i.e., number of days times water temperature) should be considered as an approximation of the environmental stress experienced by migrating Fraser River sockeye salmon and should inform in-season management decisions.
- New and properly designed research is required on Early Stuart, Early Summer, and Summer runs to complement the work done on Late-run sockeye, in order to determine any stock-specific effects of high water temperature on migrating and spawning success.
- The feasibility of modifying existing flow-control / hydro facilities and water-use agreements should be investigated, particularly those that might decrease Fraser mainstem and tributary temperatures during high-temperature years.
- The riparian habitat in tributary watersheds throughout the Fraser basin should be protected and restored, in order to reverse the warming effect that lack of cover creates through the disruption of the hydrologic cycle.
- In extreme warm-water years, fisheries managers should take additional actions to ensure that adequate and appropriate numbers of fish enter the river. Once the fish are in the river, actions such as providing a specific time and area conservation corridor are needed to create the opportunity for sockeye salmon to migrate with a minimal amount of stress caused by fishing in the river.

Response: DFO reported that several improvements to forecasting river temperature were planned for 2005: to develop long-range (months) and medium-range (weeks) forecasts of environmental conditions as an early warning system for managers, and to improve the short-range (10 days) forecasting of environmental conditions. The department's Environmental Watch Program generates forecasts of Fraser River environmental conditions, including the average lower-river temperature and flow conditions experienced by major Fraser River sockeye salmon management groups. The current

temperature network consists of logger stations between the Lower Fraser and Stuart River, including 15 DFO stations and 10 Environment Canada stations, plus thermistor chains in major lake systems to provide temperature–depth profiles. DFO agreed that new research on Early Stuart, Early Summer, and Summer runs is a high priority.

For 2005, departmental and Pacific Salmon Commission funding had been secured to conduct an exploratory radio-tagging program in order to assess the feasibility, using telemetry studies, of estimating mortality due to fishing and non-fishing factors. In 2006–7, a multi-stock telemetry project was proposed to estimate all sources of mortality. DFO agreed that the protection and rehabilitation of riparian habitat is important to provide shade, food, and protective cover for salmon, particularly juveniles. The degree to which the absence of riparian cover contributes to the warming of both tributary and mainstem portions of the river is not well understood, relative to other drivers such as weather patterns, drought, and global climate change. DFO's Environmental Process Modernization Plan and other initiatives provide a comprehensive framework for the protection of fish habitat, including riparian habitat. The department disagreed with the committee's recommendation to modify existing flow-control / hydro facilities. Numerous Nechako River studies on the influence of cooling summer flows demonstrate a negligible influence on Fraser mainstem temperatures. Any such initiatives would require the involvement of provincial authorities, private interests, and Crown agencies.

In 2005, the Standing Committee on Fisheries and Oceans concluded that, in 2004, Fraser River water temperatures during the migration of Early Stuart, Early Summer, and Summer runs were well above the average temperature of the preceding 60 years. At times they reached or exceeded the maximum temperatures recorded during these same 60 years. Elevated water temperature amplifies the incidence of diseases among salmon, impairs swimming performance, and reduces their ability to recover from net encounters, all potentially leading to increased mortality. The committee recommended that DFO and the Fraser River Panel of the Pacific Salmon Commission adopt and use more stringent guidelines for closing the fishery when water temperatures reach dangerous levels.

Response: DFO agreed. The primary tool used in-season to mitigate against environmental conditions such as water temperature was the Environmental Management Adjustment model, which is used to forecast the impact of freshwater temperatures on migrating salmon. It allows managers to estimate the number of salmon at risk under certain water temperature conditions and to increase the spawning objective and adjust the fisheries accordingly. The model provides a basis for precautionary-based fisheries management. DFO is

improving the Environmental Management Adjustment model to develop long-range (months), medium-range (weeks), and short-range (10 days) forecasts of environmental conditions.

The standing committee also recommended that DFO collect and analyze information to provide up-to-date assessments on habitat conditions and Pacific salmon stocks that are below departmental targets and declining.

Response: DFO generally agreed. There is a need to improve the integration of salmon stock and habitat information in order to guide fisheries decisions – a goal consistent with the ecological approach to fisheries management to which the department is committed. However, it will be implemented in a staged process over time, not annually. The Wild Salmon Policy will establish a framework to further focus efforts on stocks and habitat that are at the highest risk. As Conservation Units are formalized under the Wild Salmon Policy for each salmon species, reports on habitat and stock status will be based on these Conservation Units.

In 2007, the BC Special Committee on Sustainable Aquaculture concluded that British Columbia has a unique opportunity to protect and enhance its wild salmon populations and marine ecosystems while developing a thriving, innovative aquaculture industry. To that end it made 52 recommendations, including several respecting wild salmon enhancement:

- The Ministry of Environment should take a lead role in creating a living rivers strategy to improve British Columbia's river systems with scientifically based standards for watershed management, enhancement to fish habitat, and a 10-year program to correct past damage.
- Enhancement projects such as stream restorations should be given a 250 metre clearance and a guarantee that no development can take place so as to undo the work of salmon enhancement.
- The provincial government should establish Marine Protected Areas representing a minimum of five times the area licensed for aquaculture in each area.

In 2009, the BC Pacific Salmon Forum stated:

> For many years watersheds have been managed in response to industry applications. Various resource users – forest and power

> generation companies, farmers, ranchers, shellfish and finfish growers, road builders, oil, gas, mining and transportation companies – have sought government licences and permits to alter landscapes and water flows to meet their respective needs. These licences are administered by a variety of ministries or agencies. No single provincial agency measures the incremental and cumulative effects of all these individual decisions on watersheds, nor is government able to assess the capacity of watersheds to accommodate these demands while maintaining their ecological functioning condition.

The forum recommended that the BC government apply an ecosystem-based approach to managing all resources in watersheds and marine environments. The forum further recommended that the provincial government immediately enter into agreements with the federal government to strengthen and implement habitat restoration and enhancement programs to maintain, rebuild, or restore natural biodiversity and abundance of wild salmon.

To do so, the province would need to shift to a new governance system to ensure that British Columbia's wild and farmed salmon resources and habitat are managed in accordance with ecosystem-based principles. A new BC Water and Land Agency should be created to ensure consistency in applying ecosystem indicator values for all land and watersheds, and in the marine environment, to all resource industries, including aquaculture, thereby ensuring that the cumulative effects of multiple decisions do not exceed established ecosystem health indicators. All levels of government would need to collaborate on pilot watershed governance projects designed specifically to strengthen the ecosystem management of watersheds.

In 2009, the commissioner of the environment and sustainable development found that 10 percent of development projects assessed by the Habitat Management Program will have harmful effects on fish habitat. If damage to fish habitat cannot be avoided, a *Fisheries Act* authorization – a ministerial permission to harm habitat – may be issued. If such an authorization is foreseeable, then there must be an environmental assessment under the *Canadian Environmental Assessment Act*, which ultimately results in a report and a determination about the likelihood that the project will cause significant adverse environmental effects. The commissioner issued several findings.

- Because there were numerous inadequacies in the manner in which these projects were assessed, in the substantive decisions, and in the documentation, the commissioner recommended that, in order to make consistent decisions on project referrals and in accordance with departmental expectations, DFO should ensure that an appropriate risk-based quality-assurance system is in place to review these decisions.

Response: DFO accepted this recommendation and stated that, by March 2010, it would implement a risk-based quality assurance system to verify that documentation standards were being applied consistently by staff.

- Because DFO did not have a risk-based approach to monitoring proponents' compliance with the terms and conditions of ministerial authorizations and letters of advice, it should accelerate the implementation of its Habitat Compliance Decision Framework. It should also determine whether the required mitigation measures and compensation are effective in meeting the "no net loss" principle.
  Response: DFO agreed with this recommendation and committed to implementing the framework fully by March 2010. It also agreed to report annually thereafter on the results of project-monitoring activities.
- Owing to a lack of documentation in files of possible violations of section 35(2) of the *Fisheries Act,* the commissioner could not determine whether DFO was following its Compliance and Enforcement Policy. Thus, the commissioner recommended that DFO should ensure that its enforcement quality assurance and control processes were sufficient to demonstrate that its actions had been taken in accordance with this policy.
  Response: DFO accepted this recommendation and committed to establishing, disseminating, and communicating an operational protocol to the regions by August 31, 2010.
- DFO lacked information on fish stocks, quantity and quality of fish habitat, contaminants in fish, and overall water quality. It therefore lacks the scientific information needed to establish a baseline for the state of Canada's fish habitat. DFO's ongoing challenges in collecting data and selecting habitat indicators mean that it still does not know whether it is progressing toward the Habitat Policy's long-term objective of a net gain in fish habitat. The commissioner recommended that the department develop habitat indicators to apply in ecosystems with significant human activity and that it use these indicators to assess whether it is making progress on the Habitat Policy's long-term objective.
  Response: DFO agreed but cautioned that this task will require significant new scientific understanding to ensure that the indicators adopted do in fact tell us what we need to know about the health of the aquatic ecosystem. It also committed to determining by March 2010, what actions are required to fully implement the Habitat Policy.

The commissioner also directed several recommendations at Environment Canada, which has, since 1978, been responsible for the administration of the pollution prevention provisions of the *Fisheries Act*. These recommendations included the following:

- Environment Canada should set out clear objectives and results expectations for its *Fisheries Act* responsibilities and establish accountability for achieving the desired results.
  Response: Environment Canada agreed and committed to putting in place a Results-Based Management and Accountability Framework by March 2010.

- Environment Canada should identify significant risks associated with non-compliance with the *Fisheries Act*, including determining whether there are significant risks to fish habitat that are not being addressed by the combination of its own administration and enforcement of the Act and the administration and enforcement of other federal and provincial legislation.
  Response: Environment Canada agreed and stated that, by March 2011, it would complete the review of risks and risk management activities and would adjust departmental work plans as required.
- Environment Canada should review existing *Fisheries Act* regulations, guidelines, and best-management practices to ensure that they are adequate, up to date, relevant, and enforceable.
  Response: Environment Canada agreed, stating that, by March 2012, it would complete its review of four outdated regulations and either update or repeal them.

In 2010, the Pacific Fisheries Resource Conservation Council spoke in support of the precautionary approach:

> 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 Conservation Council also made several references to freshwater mortality:

- **Human effects on ecosystems** – The Council has issued a number of reports that chronicle the salmon impact 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. ... 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.
> - **Climate change impact** – The effect of climate change on Pacific salmon and steelhead freshwater habitat has been a matter of enduring interest to the Council. The impact of warmer water temperatures, wider variability of flows, and growing unpredictability of seasonal variations have been observed in relation to climate change.
> - **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 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 Conservation Council also commented on the importance of marine environment research:

> The Council's reports acknowledged the difficulties of conducting ocean research relating to wild Pacific salmon. ... 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.

Harvest management

Planning and assessment

In 1982, Dr. Peter Pearse made recommendations respecting fisheries management, including the following:

- DFO should formulate and publish long-term plans and objectives for managing each of the major species and for ensuring the most beneficial use of the resources. These objectives should include quantitative targets for production by species and management regions.
- To provide the background information needed to formulate long-term plans for salmon, DFO should prepare and publish within 12 months a salmon resource analysis, documenting the condition of the stocks, the opportunities for developing them, and an outline of the options for future management of the salmon fisheries. The document should include:
  - an assessment of the state of the salmon stocks in as much detail as information allows and an appraisal of the adequacy of this information;
  - a review of the problems arising from current fishing patterns;
  - alternative proposals for improving conservation through modifying fishing and management practices; and
  - a review of the implications of enhancement plans for effective fisheries management techniques.
- By 1985, in anticipation of the regional reorganization of the commercial salmon fleet, DFO should formulate and publish a long-term plan for salmon fisheries management. This plan should contain quantitative targets for salmon production by species and management regions based on full use of the existing productive capacity of the natural habitat and enhancement opportunities.

Response: In 1983, the government agreed that DFO needed to modernize its stock management systems and procedures, giving special attention to the acquisition and analysis of statistical data, research on and assessment of the condition of fish stocks, long-term planning for stock management, and procedures during the fishing season. Full implementation would take several years. Beginning in 1984, DFO developed Salmon Stock Management Plans, which contain long-term plans and objectives for major salmon stocks on the Pacific coast.

In 1999, the Auditor General of Canada concluded that more comprehensive reports were needed on individual stocks, or on groups of stocks within the proposed Conservation Units, to facilitate salmon fisheries management under the New Direction policy. The auditor general recommended that DFO should ensure that the responsibilities of the Pacific Scientific Advice Review Committee are in line with the needs outlined in the department's 1998 major policy statement, *A New Direction for Canada's Pacific Salmon Fisheries*, by

- requiring the committee to produce comprehensive integrated reports on stock and habitat status, taking into account traditional knowledge; and
- expanding the committee's area of reporting to cover individual salmon stocks or groups of stocks under proposed Conservation Units.

Response: DFO agreed. It would be moving to ensure that the salmon stock status reports produced by the Pacific Scientific Advice Review Committee incorporated habitat status information. The committee was already responsible for incorporating traditional knowledge in its assessments and for reporting on the status of individual stocks or groups of stocks. Stock status reports would be aligned with Conservation Units, once they were defined.

In 2003, the Chamut External Steering Committee emphasized the need for DFO to develop a policy on wild salmon that explicitly defined conservation objectives for naturally spawning salmon. It recommended that the department conduct consultations on a Wild Salmon Policy and associated guidelines with First Nations, harvesters, and other interest groups, including conservation organizations, and that the policy be finalized by the end of 2003. This policy should provide the framework for defining conservation objectives of naturally spawning salmon and should include direction for resource management (Conservation Units and reference points), habitat protection, enhancement, and aquaculture.

Response: DFO stated that development of this policy was slowed by internal debate at all levels over several key policy issues – specifically, what level of genetic diversity to conserve, the implications of the *Species at Risk Act*, and the development of an open and transparent planning process to consider social and economic factors in addition to biological ones. The department hoped to complete an internal review by March 31, 2004, and to release the policy to the public and initiate consultation as soon as possible thereafter.

In 2004, the commissioner of the environment and sustainable development recommended:

- DFO should finalize the Wild Salmon Policy so as to define conservation objectives and provide direction for the management of fisheries, protection of habitat, and salmon enhancement.
  Response: DFO stated that it was nearing completion of the Wild Salmon Policy. Following regional and national review and approval, the policy would go through consultation and final departmental approval, after which it would be released as soon as possible. The department also observed that "in virtually all salmon fisheries in British Columbia, exploitation rates are dramatically lower than a decade ago. While there have been important conservation successes, the cost to industry has been high, and as a result, the Department has come under continued pressure to relax conservation measures."
- DFO should collect and analyze information to provide up-to-date assessments on habitat conditions and Pacific salmon stocks that are below departmental targets and declining.
  Response: DFO responded that it

> collects habitat information in partnership with community groups, the Province of British Columbia, and industry sectors. These assessments are accessible in a variety of ways, including watershed atlases and on-line digital mapping. The assessments will continue and expand as new partnerships are developed.
>
> Recently developed planning tools, in conjunction with the Pacific Scientific Advice Review Committee, provide a basis for the prioritization of salmon stock assessment activities, with focus on key fisheries and weaker stocks that may be at risk.

In 2005, the Standing Committee on Fisheries and Oceans expressed agreement with the 2004 recommendation by the commissioner of the environment and sustainable development and recommended that DFO collect and analyze information to provide up-to-date assessments on habitat conditions and Pacific salmon stocks that are below departmental targets and declining.

Response: DFO generally agreed. There is a need to improve the integration of salmon stock and habitat information and to guide fisheries decisions – an objective consistent with the ecological approach to fisheries management to which the department is committed. However, it will be implemented in a staged process over time, not annually. The Wild Salmon Policy will establish a framework to further focus efforts on stocks and habitat that are at the highest risk. As Conservation Units are formalized under the Wild Salmon Policy for

each salmon species, reports on habitat and stock status will be based on these Conservation Units.

In 2010, the Pacific Fisheries Resource Conservation Council stated:

> 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 these 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.

Pre-season planning

In 1982, Dr. Peter Pearse recommended that pre-season planning should be based on an examination of alternative management strategies prepared in the course of the annual scientific assessment of the stocks.

In 1999, the Auditor General of Canada reported that DFO was committed to moving away from its existing fishing plan process toward a long-term planning process for salmon management. The change would be implemented through Integrated Fisheries Management Plans, which would integrate the activities and specialized knowledge of every departmental sector involved and use broader consultation with stakeholders beyond those with direct fishing interests. The auditor general made these recommendations:

- DFO should ensure that Integrated Fisheries Management Plans include formal recovery plans for stocks at risk.
  Response: DFO agreed in principle. Beginning in 1998, fishery restrictions were introduced that curtailed harvest by all sectors and involved fishery closures and adjustments to the area, timing, and gear specifications of permitted fisheries. Initiatives to improve salmon habitat had also been authorized, and projects in support of selective fishing practices had been conducted.
  The department would develop recovery plans consistent with these specifications when they were available and would include them in the plans.
- DFO should facilitate the application of the precautionary principle to salmon

> fisheries management by establishing catch levels and conservation limits for individual stocks or groups of stocks.
> ***Response:*** This recommendation was consistent with the Wild Salmon Policy under development by DFO. The policy, which was based on the precautionary approach, would establish escapement levels and target harvest rates that would ensure long-term sustainability. This work goes hand in hand with the requirement to establish Conservation Units and would be a central feature of departmental science input to fisheries management.

The Auditor General of Canada also recommended that DFO should, as soon as possible, act on its proposal to establish an independent allocation board.

Response: DFO agreed. It stated that it was developing an implementation plan to establish an allocation board. The final draft of its policy plan, An Allocation Policy for Pacific Salmon, which was soon to be released, provided for an allocation board and outlined its basic goals.

In 2003, the House of Commons Standing Committee on Fisheries and Oceans recommended that DFO should provide more stable access to the resource for the commercial and recreational fisheries.

Response: The government referred to the Pacific Region's 1999 Allocation Policy for Pacific Salmon:

> It states that conservation of the Pacific salmon is the primary objective and will take precedence in managing the resource. After conservation requirements are met, the policy sets out a reasonable, balanced approach to harvest allocations. It provides for the priority of First Nations' food, social, and ceremonial requirements and any rights that may be defined by treaties. It also sets out a clear policy on allocation between the fishing sectors, and within the commercial sector. When there is extremely low abundance and when conservation of stocks is at risk, as occurred with Fraser River sockeye in 2001, stable access to fishing opportunities cannot be provided.

The government added that the joint federal-provincial task force on approaches to ensure an integrated and economically viable marine fisheries sector in British Columbia, which is consistent with agreements on Aboriginal land claims, will assist governments in implementing comprehensive solutions to the challenges faced in developing a post-treaty fishery.

In 2003, the Chamut External Steering Committee made a series of recommendations respecting the Integrated Fisheries Management Plan and pre-season planning:

- Pre-season development of the Integrated Fisheries Management Plan should clearly define the priority of conservation and include other key matters such as a description of domestic and international commitments, decision rules that will guide in-season management, and a description of socio-economic objectives.
- Pending completion of a Wild Salmon Policy, DFO should consult with First Nations and other stakeholders on escapement targets to guide resource management for the 2003 fishery and on management objectives for Cultus Lake and Sakinaw Lake sockeye.
- All harvesting plans should ensure that, after conservation objectives have been addressed, priority access is granted for food, social, and ceremonial fisheries.
- DFO should initiate consultations with the Sport Fishing Advisory Board to address concerns regarding the regulation of the recreational fishery and possible impediments to the provision of stable and predictable opportunities for the recreational harvest of sockeye.

Response: DFO reported that it held 31 meetings with stakeholders in developing the 2003 Integrated Fisheries Management Plan. The plan identified stocks of concern, the department's proposed approach to deal with these stocks, decision rules to guide the fishery, and fishery-specific plans where possible. Work had begun to develop a science-based risk assessment framework for the 2004 plan. Work was under way to develop the analytical tools to establish the probabilities of extirpation associated with a range of harvesting regimes. Work had also begun to include socio-economic objectives in the 2004 plan. Pre-season consultations on Fraser River sockeye salmon escapement goals were carried out with all harvesters, and three forums provided guidance concerning the development of long-term escapement goals. Consultations took place with the Sport Fish Advisory Board regarding plans for 2003, and an in-season sockeye communication working group was created.

In 2010, the Pacific Fisheries Resource Conservation Council stated:

> 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. ...

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. ...

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.

In-season management

In 1982, Dr. Peter Pearse made the following recommendations respecting in-season management:

- In each area, a salmon management unit, reporting to the area manager, should be formed and assigned responsibility for in-season management of the salmon fisheries.
- DFO should, as expeditiously as possible, upgrade the statistical collection processing and storage system for in-season salmon fishery management, taking full advantage of advanced technology in data processing and remote terminal accessibility.
- DFO should explore the feasibility of test-fishing programs in which commercial fishing vessels conduct experimental fishing according to departmental specifications in return for all or part of their catches.
- DFO should thoroughly review its provisions for in-season management of the salmon fisheries with a view to establishing systematic procedures, including specifications for in-season field programs of test fishing and monitoring; procedures for recommending and authorizing in-season variations in regulations; and procedures for ensuring full documentation of in-season investigations, regulatory actions, and appraisals of their results.

In 1995, the John Fraser Sockeye Public Review Board found that, although DFO and the Pacific Salmon Commission had informal practices and ideas for dealing with in-season management uncertainties, they had no formal, universally accepted, publicly available policy – there had never been a thorough study of the risks associated with the present management regime. The board recommended that the department and the Pacific Salmon Commission adopt a risk-aversion management strategy because of the great uncertainty in stock estimates, in-season catch estimates, and environmental problems, so that conservation goals were achieved before any other priorities were addressed.

Response: Starting in 1995, DFO would

- develop pre-season management plans based on the lower range of pre-season stock forecasts;
- adjust escapement targets in-season, based on extreme environmental factors such as high water temperatures and adverse flow conditions; and
- reduce the harvest rates and employ management measures, up to and including closure of the fishery, when there is uncertainty as to run size.

In 2003, the House of Commons Standing Committee on Fisheries and Oceans recommended that DFO invest in more research to improve the run forecast system, including the test-fishing system.

Response: The government stated that a workshop, held in April 2003 to discuss opportunities to improve in-season run-size estimates, led to four proposals being incorporated into the Pacific Salmon Commission's data-gathering program for 2003.

In 2003, the Chamut External Steering Committee concluded that improvement was required to in-season data collection on the abundance and timing of runs. It recommended that DFO work with the Pacific Salmon Commission, First Nations, and stakeholders to develop more accurate in-season estimates through improvements to existing test fisheries, development of new test fisheries, environmental-monitoring programs, use of stock assessment fisheries, use of traditional knowledge and on-water information, and more accurate and timely catch reporting.

Response: DFO stated that it had implemented four measures to improve in-season run-size estimates:

- additional test fisheries that will improve in-season test fishing in the Lower Fraser River;
- small-fleet purse-seine fisheries in Juan de Fuca and Johnstone straits designed to simulate a regular commercial fishery;
- a small gillnet fishery in Johnstone Strait designed to provide an independent estimate of the Early Summer run size; and
- First Nations food, social, and ceremonial fishery by purse-seine, structured to augment the regular purse-seine test fisheries authorized by the Fraser River Panel in Juan de Fuca and Johnstone straits.

In 2010, the Pacific Fisheries Resource Conservation Council stated:

> 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.

Escapement enumeration and post-season management

In 1982, Dr. Peter Pearse recommended that DFO should implement an annual review and consultation as part of the process of formulating management plans for each fishery. The review should include:

- an annual scientific assessment of the status of the stocks and of the effects of the fisheries upon them;
- an evaluation of the preceding year's fishing plan, including the changes made to it, estimates of catches of major stocks, and spawning escapements; and
- a review of this information with the relevant fishery advisory committee and subsequent preparation of a fishing plan for the next season indicating the targets for catches and spawning escapements in each fishery.

Dr. Pearse also recommended that DFO should strengthen its programs of collecting and collating information on salmon escapements and spawning by these means: requiring those who collect the data in the field to document the

methods they use in estimating spawning, developing a central data system to systematically collate and store spawning records, developing new and consistent techniques for estimating spawning activity, and assembling historical information on salmon spawning for particular streams and publishing the results in close liaison with the intergovernmental aquatic habitat inventory program.

In 2005, the Williams Post-Season Review Committee for 2004 concluded that 2,334,000 sockeye salmon passed the Mission hydroacoustic station. It was estimated that the catch upstream of Mission was 486,000, which meant that there should have been a final spawning escapement of 1,848,000. However, the final spawning escapement was determined to be only 523,797, which meant that 1,324,203 fish were unaccounted for. The committee concluded that the Mission count was not a major problem and that two important factors explained this difference: the environmental conditions were more severe than the historical data indicated (i.e., more fish succumbed to warm water and the associated impact), and the catch upstream of Mission was larger than shown. The committee made three recommendations:

- An additional split-beam hydroacoustic system should be installed at the Mission site, and additional counting stations should be considered for the confluence of the Harrison River and either Boston Bar or Qualark.
- Existing assessment programs should continue to receive funding from Canada and the United States, including 12-hour turnaround, real-time monitoring for faster and more accurate data of the migrating stocks.
- The First Nations food, social, and ceremonial harvest in marine waters should be incorporated as part of the test-fishing program on a long-term basis.

Response: DFO stated that, in 2005, as a result of discussions and collaborative research with the department, the Pacific Salmon Commission undertook preliminary work to establish a side-looking acoustic system using DIDSON imaging sonar technology on the north bank of the river. In 2008, a permanent facility was constructed. The present configuration of the acoustic systems at Mission consists of a shore-based split-beam system on the south bank, covering a 100–150 metre cross-section; a shore-based DIDSON system on the right bank covering a 75 metre cross-section; and the downward-looking vessel-based split-beam system covering the middle portion of the river. DFO also stated that it was unlikely that it would consider installation of another hydroacoustic site at either Boston Bar or Qualark, given the annual operating cost of $120,000, and questioned whether a further site at the confluence of the Harrison River would provide a significant improvement. DFO also noted that acoustic sites are a bilateral responsibility under the Pacific Salmon Treaty

DFO reported that, in 2005, it would take steps to improve real-time catch reporting (authorized and unauthorized), in-season assessment estimates, and

the timeliness of estimates of environmental impact. The department stated that it supported the First Nations Marine Society food, social, and ceremonial fishery and that this new test fishery was an important component of in-season sockeye stock assessment.

In 2005, the Standing Committee on Fisheries and Oceans recommended that DFO

- equip the Mission hydroacoustic station with the latest technology; and
- establish additional acoustic estimation stations at various strategic locations in the Fraser and Thompson rivers to accomplish quantitative estimates of fish and their stock identity.

Response: DFO responded that, in 2004, a new sampling scheme became the primary source of in-season estimates at the Mission facility. A joint department / Pacific Salmon Commission team is evaluating further improvements, such as a further hydroacoustic split-beam counting device on the north shore of the river at Mission. In 2005–6, the department will conduct a cost-benefit analysis of adding a station at either Boston Bar or Qualark. In 2005, work plans include an evaluation of DIDSON (sonar) technology – an alternative acoustical method – at the Harrison River–Fraser River confluence.

Harvesting

Commercial, including licensing and gear types

In 1982, Dr. Peter Pearse made more than 60 recommendations respecting commercial licensing and rationalizing the fisheries, including the following:

- Commercial fishing licences should be issued for each species of fish separately, unless compelling technical or managerial reasons exist for authorizing fishing for two or more species under a single licence.
- Canada's Pacific coast should be divided into three broad zones for commercial licensing purposes: waters north of Cape Caution, the inside waters south of Cape Caution, and the waters of the west coast of Vancouver Island.
- A Pacific Fisheries Licensing Board should be created under legislation as a Crown corporation.
- A full-time executive director should be appointed by the board to oversee its day-to-day operations and to decide initially all questions that arise concerning commercial licences. The executive director should be responsible to the board and have sufficient staff and facilities to carry out the board's responsibilities.

- The Pacific Fisheries Licensing Board should hear all appeals from decisions of its executive director concerning licensing, and decisions of the board should be final and binding.
- Appeals to the minister of fisheries and oceans should be discontinued.
- The presentation of all appeals to the board and all board decisions should be open to the public.
- A target fleet should be defined as the objective for fleet adjustment by the end of a 10-year transitional period ending December 1992. The target should be 50 percent of the present capacity licensed to fish in each of the two fisheries (salmon and roe-herring), and the same proportion of each major gear sector. After 1986, the target for the salmon fishery should apply separately to each licensing zone.

Response: In 1983, the government agreed with the objectives of fleet reduction, but disagreed with the method. It disagreed with competitive bidding, but limited-term licences and financial compensation for fishers who voluntarily relinquished their fishing privileges ("buy-back") were still under review. The government agreed with the need to modernize all commercial licensing provisions but disagreed with some of the proposed details. It also agreed with strengthened licensing administration and with opening the licence appeals process to public scrutiny but disagreed with establishing a Crown corporation.

In June 1984, the minister announced a plan, A New Policy for Canada's Pacific Salmon Fisheries, and tabled draft legislation to provide for the restructuring of the Pacific fishery. However, the bill was not passed.

In 1995, the Pacific Policy Roundtable recommended that the minister of fisheries and oceans appoint an independent adviser to provide him with recommendations on the very complex and difficult issue of intersectoral allocations.

Response: DFO announced that Dr. Art May had been appointed to serve as an independent adviser to review long-term fisheries allocations on the West Coast.

The roundtable also recommended that the renewal of the Pacific salmon commercial fishery should be based on common elements from the three gear panel reports, including:

- an endorsement of the principles of conservation, viability, and partnerships;
- stability and security of access;
- only one commercial fishery and one manager (DFO);
- the need for significant fleet reduction and a belief that action is required before the 1996 season;

- an industry-run licence retirement program, with governments providing financial contributions, to be part of the fleet-reduction plan; and
- tax incentives to facilitate fleet reductions.

Response: In 1996, DFO minister Fred Mifflin announced a plan to revitalize the West Coast commercial salmon fishery and enhance conservation and sustainable use of the resource. The minister said that a reduction of 50 percent in the capacity of the commercial salmon fleet was necessary over the long term. The $80 million voluntary licence retirement was designed to take an equitable and immediate step in this direction by reducing the number of licences in the salmon fleet and, simultaneously, minimizing the impact on licence values.

In 1998, the Standing Committee on Fisheries and Oceans was told that although the Mifflin Plan may have reduced the size of the fleet, it had not reduced capacity because of both licence stacking and a disproportionate reduction of the commercial fleet. It recommended that the government implement a salmon licence buy-back and readjustment program for the West Coast to continue the downsizing of the fleet and that the focus of the buy-back be a reduction of capacity in the net fleet.

Response: DFO responded that the minister had, on October 14, 1998, announced a new Pacific salmon licence retirement program, to be operated as a voluntary, multiple-round reverse auction. The department would also conduct broad-based consultations to confirm a new direction for British Columbia's Pacific salmon fishery. The consultations are intended to provide fishers who are uncertain whether to stay in the fishery with the necessary information on the salmon allocation process to make decisions for their future.

Between 1995 and 1998, DFO conducted five consultation processes to review options to resolve allocation issues. The areas studied included allocation within the commercial sector (intrasectoral), allocation between the commercial and recreational sectors (intersectoral), and a review of the Aboriginal pilot sales program. The consultation processes and resulting reports were conducted by Dr. Art May (1996), James Matkin (1997), Stephen Kelleher (1997 and 1998), and Samuel Toy (1998).

Response: In December 1998, the minister of fisheries and oceans released a paper entitled "Allocation Framework for Pacific Salmon 1999–2005," following which DFO held extensive consultations with First Nations, commercial and recreational fishing organizations, community representatives, and the

Government of British Columbia. In October 1999, DFO released its Allocation Policy for Pacific Salmon, which DFO described as representing a long-term salmon allocation policy containing a series of principles for sharing harvestable surpluses of Pacific salmon among First Nations, recreational, and commercial users.

In 1999, the Auditor General of Canada made several recommendations:

- DFO should assess the risks to conservation of allowing selective fishing in the commercial and recreational fisheries, given the lack of reliable information on long-term mortality rates of released salmon. It should then build adequate safeguards into fishing plans to protect stocks at risk.
  Response: DFO responded that it was continuing studies to improve understanding of the mortality of salmon released following capture in commercial, recreational, and First Nations fisheries. The knowledge gained through these studies would be incorporated into future fisheries management plans. Current management plans took account of expected mortalities based on existing knowledge.
- DFO should specify a fleet-reduction target and timetable that are consistent with its objectives of conservation, selective fishing, and cost recovery, and work to complete fleet reduction according to this timetable.
  Response: DFO agreed. In 1996, a multi-year salmon fleet-reduction target of 50 percent was established. This target would be reviewed, taking into account various factors, in particular, the requirement to fish selectively in order to meet conservation objectives and harvest diversification opportunities.

In 2003, the House of Commons Standing Committee on Fisheries and Oceans recommended that DFO consider more flexible approaches to the management of fisheries along the lines proposed by the Area E Gillnetters Association.

Response: The government agreed with the importance of having flexible approaches to the management of fisheries and reported that it had worked with the various commercial fleet segments on the development and implementation of new measures, such as revising the trigger for starting pilot sale fisheries in the Lower Fraser River, harvesting of small surpluses in accordance with a proposal from the Area E fleet, and proposing an Area E small-fleet opportunity that would allow for a limited harvest of Chinook salmon.

In 2004, Dr. Peter Pearse and Prof. Donald McRae asserted that the commercial salmon fishery was verging on bankruptcy owing to overfishing and depleted stocks, overexpanded fishing fleets, low earnings, unstable employment, and internal conflict. They concluded that sweeping changes were required to respond to new challenges, such as treaty settlements, stricter requirements for resource conservation, and reduced abundance of fish (believed to be mainly a result of prolonged cyclical decline in the productivity of the ocean). Based on the Nisga'a Treaty and six other agreements in principle, the pattern is for most agreements to include provision for an Aboriginal food fishery (food, social, and ceremonial) in the treaty itself, and for a commercial fishery to be included in a separate harvest agreement, which specifies a percentage of the total allowable catch and provides for catch monitoring, fisheries management, and the location of permitted fishing. To meet these challenges, Pearse and McRae concluded that a different management approach was required – the fundamental need was to find a way to adjust the number of vessels that fish to fit the circumstances of each fishery. They made the following recommendations:

- DFO should be granted authority to specify the maximum number of vessels that may fish in any opening of the fishery.
- Each area harvest committee should be free to decide how the limited number of vessels will be selected,
- The current "catch as much as you can" salmon-licensing system should be replaced by a system based on defined shares of the catch, which has proven to be successful in the individual quota system in other fisheries. To that end, DFO should reaffirm its coast-wide allocation policy, including the allocation of salmon among the three commercial sectors. Next, the shares of individual salmon fishers that will form the basis of a catch-share system should be determined by the fishers themselves, through area harvest committees. Each fisher's share of the area allowable catch should be fixed and incorporated into new long-term and transferable quota licences.

In 2005, the Williams Post-Season Review Committee found that sockeye returning to the Fraser system encounter a series of harvest efforts involving several types of fishing gear, which have a cumulative effect on total harvest and incidental mortality. The committee made two recommendations:

- Research should be conducted to verify whether the selective placing of set nets deprives fish of resting places (or forces them to swim in the faster and more turbulent midstream waters), thereby having an adverse impact on upstream migration. Departmental policy should ensure the existence of "conservation corridors" for the fish destined for spawning grounds.

- Research is also needed into the relationship between gillnet mesh size and the desired spawning ground–gender ratio.

Response: DFO did not agree with these recommendations. Food, social, and ceremonial fisheries are accorded priority over other harvest opportunities, and if these agreed objectives are not being met, other harvest sectors may have to be constrained before in-river First Nations fisheries could be altered in a significant way. Fisheries throughout the migration route all have an impact on Fraser River salmon stocks. Current management frameworks take into account the cumulative impact on stocks, and fishing times / locations are governed accordingly. With respect to gillnet mesh size, DFO is not aware of the issue of "gender imbalance" on the spawning grounds. If a chronic or pressing issue is identified, it would have to be researched, but elements other than mesh size (e.g., gillnet-hang ratio; length, depth, and fishing times) would also have to be considered. In 2005, DFO, in co-operation with the First Nations, will undertake a preliminary study on the impact of drift and set gillnets in the Fraser River above Mission.

In 2005, the Standing Committee on Fisheries and Oceans was concerned about the use of drift gillnets on the Fraser River above Mission. It recommended that such fishing be disallowed, pending completion of a study into the impact (including the "drop rate") of drift gillnets and set gillnets in the Fraser River on the mortality of migrating salmon and of any compounding effects of elevated water temperature.

Response: DFO agreed and stated that, beginning in 2005, the department would, in co-operation with the First Nations, undertake an exploratory study on the impact of drift and set gillnets in the Fraser River above Mission. The study will have to be conducted for more than one year to obtain reliable results, and studying the relationship between gear types and any compounding effects from elevated water temperatures will require longer-term study. DFO did not agree with an immediate ban but would, pending completion of the study, continue to assess on a case-by-case basis whether the use of drift gillnets can be authorized in Aboriginal fisheries above Mission.

Aboriginal entitlements and Aboriginal commercial fisheries programs

In 1982, Dr. Peter Pearse made 13 recommendations respecting what was then called the Indian fishery, including the following:

- DFO should allocate a specific quantity of fish to be available annually to each Indian band involved in the Indian fishery.
- The quantity and kind of fish to be allocated to each band should be determined through negotiations with the bands, primarily with reference to their catches in recent years but also taking into account special circumstances relating to population trends and economic opportunities.
- DFO should be committed to giving the catch allocated to Indian bands priority over the commercial and sport fisheries. If in any year a band fails to harvest its allocation because of conservation measures imposed by the department, and if the department is unable to provide an alternative source of fish, DFO should be required, in subsequent years, to make up the deficiency plus an amount to compensate the band for the delay in obtaining its catch.
- Each band should be given opportunity to choose whether its entitlement to fish will be allocated through Indian fishing permits or a new Indian fishery agreement:
    - Indian fishing permits should be issued annually to individual fishers directly by DFO or through band councils. Permits should authorize Indians to take fish for food and ceremonial purposes only. They should specify the quantity and composition of the authorized catch and the location, time, and method of fishing as required for management purposes.
    - DFO should be authorized to enter into Indian fishery agreements with Indian bands which carry terms of 10 years and, under fisheries management plans, specify the band's allocation of fish, authorize harvest according to an annual fishing plan determined jointly by the band and the department, and, where appropriate, authorize the band to engage in enhancement activities on or near its reserves and to augment its allocated catch by a portion of the enhanced stocks. These agreements should exempt the band from restrictions on the sale of fish under agreed monitoring and marketing arrangements.
- Band councils should be encouraged to take responsibility for administrative and supervisory functions associated with Indian fisheries.
- DFO should encourage Indian organizations to participate in mariculture and ocean ranching through carefully selected mariculture leases.
- DFO and the Department of Indian and Northern Affairs should, in consultation with Indian organizations, explore means of providing technical, financial, and educational assistance to enable Indians to develop opportunities under Indian fishery agreements and mariculture leases.

Response: The government stated that, for further information on policy work in the 1980s related to First Nations fisheries, one should see the March 13, 1986, discussion paper entitled "A Policy for BC Indian Community Salmon Fishery."

Dr. Pearse also made recommendations respecting Indians in the commercial fisheries, including the following:

- The federal government should proceed toward implementing the Indian Fishermen's Economic Development Program (IFEDP) as quickly as possible.
- The Department of Indian and Northern Affairs should provide staff and resources for the purpose of monitoring the financial performance of Indian fishing operations under the IFEDP.
- Licences held by Indian fishing corporations should not be transferable to non-Indians, and licensing policies should be developed to enable such licences to be leased to individual Indians.
- The Department of Indian and Northern Affairs should provide Indians and Indian corporations with the financial assistance they need to compete successfully in the proposed periodic reissuing of licences by competition.

Response: In 1983, the government agreed with the need to reform policy respecting the Indian fisheries – policy options were under review. The government was also reviewing, in conjunction with the Department of Indian and Northern Affairs, implementation of the Indian Fishermen's Economic Development Program. In 1985, the Native Fishing Association was created with funding of $11 million, to be used for debt relief, vessel and licence purchases, vessel upgrades, and training.

In 1992, Dr. Peter Pearse and Dr. Peter Larkin concluded that the 480,000 returning sockeye which DFO had identified as "unaccounted for" could, in fact, be accounted for. About half had died from natural causes or from fishing-induced mortality (e.g., died in nets or from stress after escaping from nets). The other half had been caught in the Fraser River. Pearse and Larkin stated: "We cannot say who took the unrecorded catch, whether they were Indians or not, what portion was taken in the Agreement area, how they were disposed of, or where they went. Nor can we say whether they were caught illegally." They described the 1992 season as not so much a crisis in salmon management as a crisis of policy, caused primarily by last-minute implementation of the June 29, 1992, Aboriginal Fisheries Strategy, which, among other things, resulted in special agreements with a few Indian communities in the Lower Fraser River for one-year pilot projects for the sale of fish. They concluded that such agreements can be reconciled with proper management of the resource, but only if all parties are committed to conservation, different Indian groups work together, fishers and managers are accountable, and strict enforcement, good communication, and consultative structures are all in place. In addition, Native guardians require better training, and designated landing sites must be specified.

Response: In response to the Pearse and Larkin report, in December 1992 the minister of fisheries and oceans announced an action plan that included the following measures:

- The government would enter into consultation with the 97 chiefs of the Fraser River First Nations, to work toward an allocation framework embracing the whole Fraser watershed.
- The experimental pilot sales program would be extended for another year, but no agreements would be negotiated without appropriate enforcement measures to ensure compliance.
- DFO would work with the Province of British Columbia, First Nations, and the processing industry to develop a better system to license buyers of fish from Aboriginal fisheries, regulate processing and limit landing sites, and ensure accurate and timely recording of catches and sales.
- DFO would strengthen enforcement in 1993, including helicopter coverage.
- DFO would upgrade training on Aboriginal fisheries management and enforcement issues, and would train an additional 50 Native guardians.
- Additional hydroacoustical counting stations would be set up in 1993 to provide estimates of progressive escapement past Aboriginal fisheries. DFO subsequently decided to install an acoustic site near the confluence of Qualark Creek and the Fraser River.

In 1995, the John Fraser Sockeye Public Review Board made a series of recommendations about the Aboriginal Fisheries Strategy:

- DFO should ensure that Aboriginal Fisheries Strategy agreements clearly identify the minister's responsibility for conservation and that final authority to regulate and protect fish and fish habitats remains vested in the department.
  Response: DFO agreed, stating that this clause was already contained in the agreements.
- DFO should expedite implementation of an effective training program to develop fisheries management, enforcement, and administrative capacity within First Nations communities.
  Response: DFO would ensure that training in administration would be provided. DFO and the Skeena Fisheries Commission had already set up a field program, which would guide future programs elsewhere. Finally, the department would explore opportunities for programs to be delivered by accredited police agencies and post-secondary institutions.
- DFO should separate food and commercial fisheries.
  Response: DFO agreed.
- DFO should ensure that the pilot sales program is not expanded, landing sites are specified in the agreements, agreements require that all fish landings are

documented, and any undocumented sale of fish is deemed an illegal sale.
Response: DFO agreed.

- DFO should pursue a policy of purchasing licences in the commercial sector and transferring them to First Nations communities.
Response: DFO confirmed that this policy was currently being implemented.

In 1998, the Standing Committee on Fisheries and Oceans heard testimony that the pilot sales aspect of the Aboriginal Fisheries Strategy created a racially based division in the commercial sector which was seen as socially divisive – commercial fishers should all be treated on the same basis. The committee recommended that DFO reconsider its pilot sales program and that increased Aboriginal participation in the commercial fishery be achieved by buying back existing commercial licences and transferring them to First Nations fishers.

Response: DFO responded that the pilot sales program had benefited overall fisheries management efforts (e.g., by improved catch monitoring and reporting). In renegotiating the pilot sales agreements for 1999, DFO would also consider advice received from the 1997 Matkin report. Since 1993, the department had facilitated the retirement of approximately 133 commercial licences and the issuance of communal licences to Aboriginal organizations in the Pacific Region, and this program would be expanded over the next few years.

In 1999, the Auditor General of Canada reported that First Nations had assumed a major role in data collection respecting escapement, catch monitoring, and stock and habitat assessment, but that much of the data was unreliable. The auditor general recommended that DFO should evaluate the comprehensiveness and quality of data collected under the Aboriginal Fisheries Strategy and the adequacy of the standards and procedures that guide data collection, compilation, and reporting, with a view to improving and expanding the role of the strategy in this area.

Response: DFO responded that, through the Aboriginal Fisheries Strategy, the role of First Nations in data collection and reporting was evolving. First Nations were becoming more proficient at collection and reporting of data. The department acknowledged the need to define data quality standards and methods more rigorously and to establish reporting procedures. Fisheries management staff were working with the Science, Stock Assessment, and Habitat and Enhancement branches to integrate the process of collecting and reporting the data.

In 2003, the Standing Committee on Fisheries and Oceans examined complaints that the Fraser River commercial fishery had been effectively shut out in the 2001 season notwithstanding substantial runs of several species. The committee acknowledged that, in *R. v. Sparrow*,[6] the Supreme Court of Canada recognized an Aboriginal right to fish for salmon for food, social, and ceremonial purposes in areas where fishing for salmon had always constituted an integral part of the Aboriginal distinctive culture. The Court declined to consider whether there was also an Aboriginal right to fish for commercial purposes. However, in subsequent decisions (e.g., *R. v. Van der Peet*[7] and *R. v. Gladstone*[8]), the Court ruled that an Aboriginal right to sell salmon was specific to individual Aboriginal communities and had to be decided on a case-by-case basis. The committee was critical of the pilot sales component of the 1992 Aboriginal Fisheries Strategy, acknowledged by the minister of fisheries and oceans as a policy response to an extensive problem of poaching and illegal sales, because it blurred the distinction between food fish and sales fish and had the effect of giving Aboriginal participants in the pilot sales program an unfair priority in the commercial fishery. The committee made the following recommendations:

- DFO should return to a single commercial fishery for all Canadians in which all participants in a particular fishery would be subject to the same rules and regulations. Consequently, the department should bring an end to the pilot sales projects and convert current opportunities under the pilot sales program into comparable opportunities in the regular commercial fishery.
- The federal government should ensure that DFO respects the "public right to fish."
- As long as the pilot sales agreements continue, food and sale fisheries on the Fraser River and elsewhere should be kept completely separate.
- Equal priority of access to the resource should be provided to all commercial fisheries, whether public or Aboriginal Fisheries Strategy pilot sales fisheries, and all measures required for conservation purposes should be applied equally to both fisheries.
- DFO should establish realistic food fisheries and should follow through on the previous minister's commitment to ensure that food fishery access is not being abused.

Response: The federal government did not agree with the recommendation that DFO should return to a single commercial fishery and bring an end to the pilot sales program. The *Fisheries Act* allows for separate and distinct fisheries. The pilot sales program has provided guidance on the design and conduct of Aboriginal in-river commercial fisheries in advance of their implementation in treaties and has assisted in building up capability in First Nations' management of the fisheries. It has also reduced conflict with First Nations' communities over illegal sales of fish taken in food, social, and ceremonial fisheries and has improved the economic

6 [1990] 1 SCR 1075.
7 [1996] 2 SCR 507.
8 [1996] 2 SCR 723.

benefits to First Nations. Integrating the pilot sales fishery into the commercial fishery is not acceptable to affected First Nations, which want to maintain a small-boat commercial fishery in areas close to their communities. These First Nations view it as a traditional fishery and claim it as an Aboriginal right. The government agrees that, if continued, the pilot sales fishery should have equal priority with other commercial fisheries. Since the 2001 season, fishery openings in the Lower Fraser River have been announced only when there is sufficient allowable catch to provide for both a pilot sale fishery and a commercial Area E gillnet fishery.

The government's view is that the common-law public right to fish referred to by the committee may be limited or abrogated by competent legislation. All commercial and recreational fisheries are regulated and restricted by federal legislation, such as the *Fisheries Act* and regulations.

DFO did not enter into pilot sales agreements for 2003 in the Lower Fraser River because of the BC Provincial Court decision in *Kapp*.[9] It has, however, had ongoing discussions with First Nations on arrangements to provide for future commercial salmon-fishing opportunities corresponding to those in the terminated pilot sale fishing program.

DFO enters into negotiations with Aboriginal groups to set appropriate catch levels for their food, social, and ceremonial harvests. The department believes that fisheries for these purposes are well managed and monitored, although no fishery is without compliance issues.

In 2004, the First Nation Panel on Fisheries made seven recommendations:

- Canada should take steps immediately to ensure that First Nations have access to adequate quantities of fisheries resources for food, social, and ceremonial purposes.
- As a starting point and an interim measure, Canada should take immediate steps to allocate to First Nations a minimum 50 percent share of all fisheries, with the understanding that this proportion may eventually reach 100 percent in some fisheries.
- First Nations themselves must address intertribal allocations.
- Canada should immediately increase treaty settlement funds, or funds through other negotiating processes, to enable purchase or buy–back of licences and allow for the reallocation recommended above.
- Canada should immediately recognize in policy, and implement through negotiated agreements, the Aboriginal right to manage fisheries.
- Canada should clearly articulate how it will provide fisheries resources for First Nations' commercial benefit, in light of the uncertainty created by the *Kapp* decision and the loss of pilot sales.

9 [2003] 4 CNLR 238, 2003 BCPC 279 (BC Prov. Ct.); reversed (2008), 294 DLR (4th) 1 (SCC).

- A moratorium should be placed on the further introduction of individual property rights regimes such as individual fishing quotas unless First Nation interests, including allocations in those fisheries, are first addressed.

Sport fishing

In 1982, Dr. Peter Pearse made recommendations respecting the sport fishery, including the following:

- The government's policy should explicitly recognize sport fishing as a legitimate, valuable, and significant use of fish resources, and this recognition should be reflected in a commitment of staff and budget.
- Sport-fishing policy should aim at preserving the quality of sport-fishing opportunities. That implies dampening the rate of growth of sport-fishing effort and maintaining average catches until the available harvest can be increased.
- The governments of Canada and British Columbia should co-operate in integrating saltwater and freshwater sport-fishing licences, so that both can be acquired through a single document that all agents are then authorized to issue.
- For the next five years, DFO should aim at providing an annual coast-wide sport catch of 1 million salmon, of which not more than 900,000 should be taken in the Strait of Georgia and Fraser River systems.
- DFO should immediately begin to develop a comprehensive data and information system for the sport fishery.
- A central component of the information system should be an intensive and continual creel survey.
- DFO should develop a rapid data-processing system designed to integrate sport-fishing information into general salmon management planning.
- DFO should sponsor research on the value of sport-fishing opportunities on the Pacific coast and what effect regulations have on those values.

Response: According to DFO's Recommendations and Responses, the government agreed in 1983 to give greater recognition to the sport fisheries as important and valuable users of the resource. It also agreed to make database improvements and to develop policies and programs. In 1984, the government announced that a developmental policy for sport fishing would be pursued as part of the New Policy for Canada's Pacific Salmon Fisheries. In 1986, Canada's fisheries ministers released a draft policy statement for recreational fisheries entitled "A Cooperative Approach to Recreational Fisheries Management Regarding Canada."

Responsibility for salmon farms

In 1982, Dr. Peter Pearse made several recommendations for mariculture and ocean ranching.

- DFO should promote the development of mariculture on the Pacific coast by providing technical support and a system of mariculture leases.
- DFO's program for mariculture leases should include ocean-ranching operations based on development of natural stocks and artificial production.
- For the time being and until the feasibility of these ventures and regulatory method is demonstrated, DFO should approve only a few mariculture leases involving ocean-ranching operations as pilot projects.
- Mariculture or ocean-ranching operations should be authorized by DFO under mariculture leases. Each mariculture lease should designate a specific area in which its holder has the exclusive right to harvest and manage specified species of fish.
- Mariculture leases should require their holders periodically to submit plans for DFO's approval concerning the management, enhancement, and harvesting of fish under them. The duration of plans, and the frequency of obtaining approvals of them, should be determined for each lease in view of its particular circumstances. The approved management plans should form part of the lease.

Response: According to DFO's Recommendations and Responses, the government announced in 1983 that the feasibility of commercialized ocean-ranching operations was under review. Under the government's 1984 New Policy for Canada's Pacific Salmon Fisheries, the minister of fisheries and oceans would undertake an expanded program to develop new fisheries and to promote development in aquaculture and mariculture that was targeted on coastal communities and displaced fishers.

In 2000, the Auditor General of Canada recommended that DFO act immediately to strengthen monitoring and enforcement capabilities for salmon-farming operations and to expand and improve the Atlantic Salmon Watch Program to provide the information necessary to assess the effectiveness of the department's regulatory and management activities.

Response: DFO responded that it was committed to sustainable development of the aquaculture industry and was meeting its challenges through the multi-pronged action plan:

- DFO's Program for Sustainable Aquaculture (2000), a $75 million investment over five years, would improve its capacity to conduct fish habitat and environmental assessments of proposed aquaculture development, to monitor compliance with and enforce its regulatory responsibilities, and to build on its existing and growing knowledge base of the potential ecosystem impact of an expanded salmon industry.
- DFO would refine the application of section 35 of the *Fisheries Act* (harmful

alteration, disruption, and destruction of habitat) as it applies to aquaculture operations.
- DFO would develop regulations under section 36 of the *Fisheries Act* to control the deposit of any deleterious substances from aquaculture operations.
- DFO would work closely with provincial departments responsible for aquaculture to harmonize federal and provincial roles and reduce unnecessary duplication.
- DFO would work with provinces and industry to establish a national aquatic animal health program aimed at reducing the incidence of disease and the severity of the impact.
- DFO would work with the BC government, which had announced more stringent measures to help prevent fish farm escapes.
- DFO would provide additional funding to the Atlantic Salmon Watch Program for 2000–1 and increase the number of streams surveyed.

In 2000, the Auditor General of Canada reported that federal and provincial jurisdictions overlapped in the regulation of fish farming. In 1988, DFO and the Province of British Columbia entered into a Memorandum of Understanding on Aquaculture Development, under which British Columbia had primary responsibility for management and development of the aquaculture industry in consultation with the department, while the department retained regulatory responsibility in a number of areas, including conservation and protection of fish and fish habitat. DFO had no formal plan for managing risks associated with an expanded fish-farming industry. It participated in the province's 1997 Salmon Aquaculture Review, which included 49 recommendations to mitigate potential risks / effects of salmon farming on the environment. DFO accepted the review's conclusion that salmon farming poses a low risk to wild Pacific stocks. It was taking an advocacy role in aquaculture, as reflected in the Federal Aquaculture Development Strategy (and the position of commissioner for aquaculture development).

The auditor general found that DFO was not ensuring that salmon farms were monitored for effects on fish and fish habitat, with a view to enforcing the *Fisheries Act*. Nor was it currently monitoring effects on marine habitat or on juvenile or adult Pacific salmon in the vicinity of net cages. There was also a problem with the manner in which Environment Canada was carrying out its monitoring responsibilities in relation to wild salmon and their habitat – a task it was required to do under a 1985 memorandum of understanding with DFO (under which responsibility for administering section 36 of the *Fisheries Act* was delegated to Environment Canada). Consequently, the auditor general recommended action as follows:

- DFO should act immediately to strengthen its monitoring and enforcement capabilities for salmon-farming operations.
- DFO should identify areas of needed research to understand the potential effects of an expanded salmon industry. It should assign priorities to ensure the

most effective use of limited resources within the time period remaining before new farm site proposals are reviewed.
- Given that escapes of Atlantic salmon from open-net rearing facilities are expected to continue into the foreseeable future, DFO should expand and improve the Atlantic Salmon Watch Program to provide the information necessary to assess the effectiveness of its regulatory and management activities.
- DFO should take immediate action to determine how the concept of "harmful alteration, disruption or destruction of habitat" will be applied to salmon farming and how the "deposit of a deleterious substance" will be addressed, so it can provide the Province of British Columbia with comprehensive comments on potential conflicts between federal legislation and provincial regulations.

Response: DFO responded that it was committed to sustainable development of the aquaculture industry. Through its Program for Sustainable Aquaculture (2000), the department would invest $75 million over five years, including environmental and biological science ($13.75 million), strategic research and development ($20 million), measures to ensure the quality and safety of fish and fish products ($20 million), and an improved regulatory and management framework for the aquaculture sector ($21.5 million). The program will also enable the department to build on the existing and growing knowledge base of the potential ecosystem impact of an expanding salmon industry. The department is placing a priority on further addressing a number of issues related to environmental and habitat protection under sections 35 and 36 of the *Fisheries Act*. The department is committed to working with the industry and its provincial counterparts to reduce the risk of farmed fish escapes, which currently represents only 0.3 percent of the total harvest. The department has provided additional funding to the Atlantic Salmon Watch Program. However, the chances of finding escaped salmon are low, and extensive funding required for comprehensive monitoring would divert investments otherwise available to restore habitat and protect wild stocks – activities with proven benefits.

In 2001, the Leggatt Inquiry into Salmon Farming in British Columbia concluded that escapes of farm fish, disease transfer, and pollution that flows from net cages to the surrounding marine systems are the root cause of most of the environmental damage attributed to the industry. However, closed-loop containment systems, on land or at sea, that isolate the salmon farm from the marine environment by replacing net cages with impermeable structures prevent waste from being discharged into the environment and will resolve most of the problems. The inquiry recommended that all net-cage salmon farms be removed from the marine environment by 2005 or be converted into closed-loop containment systems.

The Leggatt Inquiry also concluded that, notwithstanding the 49 recommendations made by the provincial Salmon Aquaculture Review, many of those recommendations had not been acted on, and many other environmental issues remained unresolved.

The inquiry felt that it would not be prudent to lift the 1995 moratorium or allow any further expansion until the industry made significant progress at existing farm sites, including an end to net-cage salmon farming. The inquiry recommended that the moratorium on new farm sites should be maintained, with no further expansion at existing sites, and that the Salmon Aquaculture Review be completed and updated.

The Leggatt Inquiry report discussed the precautionary principle, which it defined in the following terms: "[R]isks to the environment or human health should be managed despite the lack of scientific proof that damage has occurred or will occur." The inquiry recommended that the precautionary principle should apply to the regulation of the salmon-farming industry.

In 2004, the federal commissioner for aquaculture development (within DFO) prepared a long-term vision for aquaculture in Canada, with specific recommendations on the appropriate federal role to help achieve this vision and fully implement the Federal Aquaculture Development Strategy. The commissioner reported on the importance of aquaculture in Canada and globally, and added:

> Through the managed production of fish, shellfish and aquatic plants, aquaculture presents a sustainable means to enhance the productivity of Canada's fish and seafood sector and provide social and economic stability in our coastal and rural communities. It will also provide an opportunity to regain our former lead position in the international seafood trade.

The commissioner argued that, although DFO's regulatory role is of paramount importance in securing public confidence in aquaculture and helping the industry earn its social licence, it is urgent that the federal government recognize the agricultural nature of aquaculture and establish a public policy and regulatory environment that distinguishes aquaculture from fisheries and that establishes the rights of aquaculturists to manage their private stocks according to agronomy principles and market forces instead of having to follow regulations aimed at controlling public fisheries. To that end, the commissioner made several recommendations, including the following, to the federal government:

- The government should establish regulations pursuant to section 36 of the *Fisheries Act* to authorize the deposition of deleterious substances in relation to aquaculture operations under prescribed circumstances and protocols.
- The government should establish interim guidelines for the deposition of deleterious substances used within the aquaculture sector, based on knowledge currently available in Canada and in other jurisdictions.
- The government should enact a regulation under section 43 of the *Fisheries*

Act which would allow officers discretion to avoid having to consider whether a new or proposed aquaculture operation was likely to cause a harmful alteration, disruption, or destruction under section 35 of the Act. Such discretion would be limited to situations where the new or proposed aquaculture operation explicitly subscribed to an approved code of practice that addressed fish habitat concerns.

- The government should establish a special fund to provide financial resources for development and implementation of integrated management pilot projects in areas where aquaculture is prevalent. The aim of these pilot projects is to develop tools to reduce or eliminate conflict, including establishing aquaculture-suitable zones or aquaculture-free zones, bay management projects, or other coastal land-use planning initiatives.
- The government should provide new funding to support the continued growth of the aquaculture sector.

One of the organizational scenarios proposed by the commissioner was that Agriculture and Agri-Food Canada (AAFC) be given responsibility for aquaculture development. AAFC would regard aquaculture operators as farmers and provide the same type of policy and program support to fish farmers as to terrestrial farmers. DFO would maintain its regulatory responsibilities for the protection of wild fish stocks and fish habitat. It would support AAFC's development efforts by means of a regulatory and policy framework that would be conducive to sustainable growth and development of the sector.

In 2004, the federal commissioner of the environment and sustainable development recommended that DFO collaborate with the provinces to assess and monitor salmon aquaculture in order to prevent harmful effects on wild stocks and habitat.

Response: DFO responded that it had, with British Columbia, developed a harmonized approach to manage the effects of aquaculture on fish and fish habitat. These arrangements were being formalized through letters of understanding, which would be signed by March 2005.

The commissioner also reported that there were still significant gaps in necessary research on the potential effects of salmon aquaculture in aquatic ecosystems and on wild salmon stocks, including diseases, sea lice, and escapes. The commissioner recommended that DFO set priorities and develop a long-term research plan to address knowledge gaps on the potential effects of salmon aquaculture in aquatic ecosystems and on wild salmon stocks.

Response: DFO stated that it

- had an active research program for evaluating the environmental interactions of salmon aquaculture;
- had undertaken a state-of-knowledge initiative to identify research gaps and priorities; and
- would, by March 31, 2005, finalize a state-of-knowledge work plan for scientific advice on the impact of salmon aquaculture on fish habitat, and would, working with British Columbia, industry, academics, and stakeholders, develop a research plan to address gaps in project-environment interactions related to salmon aquaculture.

The commissioner also recommended that DFO consult with Environment Canada to determine how deleterious substances from aquaculture can be controlled, monitored, and enforced.

Response: DFO and Environment Canada would continue to evaluate and improve management practices for deleterious substances related to aquaculture operations.

In 2005, the Auditor General of British Columbia made several recommendations so that the province could effectively manage its responsibilities to sustain wild salmon, including several dealing specifically with aquaculture. The auditor general recommended that the province

- take steps to resolve the aquaculture-siting issues;
- pool its research resources with those of relevant federal agencies to address more efficiently and effectively the priority knowledge gaps associated with the interaction of wild and farm salmon; and
- reassess the statutory time limit and strengthen the penalty provisions in its current aquaculture policy framework.

In 2007, the BC Special Committee on Sustainable Aquaculture concluded that British Columbia has a unique opportunity to protect and enhance its wild salmon populations and marine ecosystems while developing a thriving, innovative aquaculture industry. To that end it made 52 recommendations, including the following:

Ocean-based closed containment

- A rapid, phased transition to ocean-based closed containment should begin

immediately. Within three years, ocean-based closed containment must be developed. Once developed, industry must transition to this technology within the subsequent two years.
- To meet the initial three-year deadline, the provincial government, in partnership with the federal government and the salmon aquaculture industry, must urgently finance and conduct a full commercial-scale, ocean-based closed containment project.
- The provincial government should develop and provide incentives to the aquaculture industry to facilitate the transition to ocean-based closed containment technology.

North and Central Coast
- No new finfish sites should be approved north of Cape Caution.
- The existing Klemtu sites should be grandfathered.
- Any expansion in Klemtu, as elsewhere, must use ocean-based closed containment technology.

Siting and monitoring
Once all the existing sites have transitioned to ocean-based closed containment, the opportunity to expand to new sites with this technology can be considered, subject to conditions.

Fallowing of sites
Effective fallowing regimes must be developed to protect juvenile salmon populations during migration periods, based on the precautionary principle, the best available science, and local and cultural knowledge.

Density
There should be no increase in production levels per site or per tenure.

Regulatory regime
- There must be a clear division of responsibility between the Ministry of Agriculture and Lands and the Ministry of Environment. Programs that promote aquaculture development should be within the Ministry of Agriculture and Lands. All protection, regulation, and monitoring of the aquaculture industry must be within the mandate of the Ministry of Environment.
- Adequate resources should be distributed accordingly to ensure that a robust compliance and enforcement regime is in place with adequate monitoring and feedback.
- All fish health–management plans must be made public and easily accessible on the website of the Ministry of Environment, to increase transparency and to give greater confidence to British Columbians that all industry players are obeying best-practice standards.
- Reporting can no longer rely on industry policing itself. The government, as the regulator, must conduct random checks *without notice* to any fish-farm operators.

Sea lice and treatment

- Government should establish protocols that specifically refer to sea lice monitoring and control, including separation of generations, regular fallowing of farm sites, early harvest of two-sea-winter fish, no placement of adult fish into pens until smolts have travelled through the migratory areas, and consideration of tidal effects on disease transfer.
- Government should continue its stringent limits on the number of sea lice per fish, in accordance with the best practice in Norway.

Net treatments

During the transition to closed containment, the use of anti-fouling paint on nets must be prohibited, in order to protect the marine habitat.

Fish feed

Use of fishmeal and fish oil derived from wild sources must not exceed one pound of wild fish harvested for every pound of aquatic animals grown.

In 2009, the BC Pacific Salmon Forum recommended to the British Columbia government that it should adopt the ecosystem-based approach discussed earlier in order to address the potential impact from salmon aquaculture in the province. It would do so by

- setting performance-based indicators for farmed salmon production and supporting a coordinated area management approach in the Broughton Archipelago;
- applying the ecosystem-based approach piloted in the Broughton Archipelago to other coastal regions;
- adopting a coordinated area management approach to salmon aquaculture throughout the province; and
- adopting integrated pest management and integrated disease management approaches to salmon farm management, through working with the salmon-farming industry.

The forum also recommended that British Columbia build confidence in wild and farmed salmon management through oversight, collaboration, and improved science, with a focus on solutions as opposed to advancement of positions. This objective would be achieved by

- establishing an independent provincial regulatory oversight authority to monitor and audit decisions that affect watersheds, in accordance with proposed ecosystem-based indicators;
- establishing a science secretariat to serve as a centre for excellence for

ecosystem-based research on marine and watershed systems that support salmon; and
- encouraging third-party certification for commercial salmon fisheries and salmon aquaculture in British Columbia.

The forum found that there is no commercial-scale closed containment salmon farm growing adult salmon operating anywhere in the world. It recommended that British Columbia design and implement a commercial-scale trial of a closed containment system for raising farmed salmon. It must ensure that ecosystem-based indicators – significant reduction in the risk of lice and disease transfer to the natural environment – are effectively achieved.

Enforcement

In 1982, Dr. Peter Pearse made 25 enforcement recommendations, including the following:

- DFO should abandon its vague and inappropriate voluntary deterrence policy as its primary aim in enforcement and replace it with a vigorous and well-organized enforcement capability in line with the recommendations made below.
- In the Pacific Region, a special enforcement unit should be created whose *exclusive* responsibilities will be enforcement. Its duties should *not* include resource management.
- At Pacific Region headquarters in Vancouver, a senior enforcement officer and support staff should be appointed and placed directly in charge of all fishery enforcement officers. These officers should be responsible directly to headquarters, rather than through area managers as they are now.
- If the need arises, a special task group operating from headquarters should be created, along the lines of the disbanded General Investigation Unit, to supplement district enforcement officers during hectic periods and to investigate complex crimes when necessary.
- The *Fisheries Act* should clearly confer peace officer status on enforcement officers, other fishery officers, and fishery guardians.
- The provisions of the *Fisheries Act* that deal with obstructing fishery officers should be eliminated or redrawn to conform with the powers and rights they have under the Criminal Code as peace officers.
- DFO should pursue an aggressive policy in seizing vessels and equipment when offenders are caught and charges are laid.
- In flagrant cases, Crown counsel should oppose applications to court by the accused for the release of equipment pending trial. For others, where circumstances warrant, they should argue for substantial bonds, approximating the market value of the vessel and equipment under seizure.
- Illegally caught fish and illegal equipment should be forfeited to the Crown, as at present.

- All categories of licences – commercial, sport, and Indian – should be liable to suspension for a violation of the terms of the licence, the *Fisheries Act*, or the regulations, on the conviction of the licence holder.
- Licence cancellation should be invoked for the most flagrant of violations and recalcitrant repeat offenders.

Response: According to DFO's Recommendations and Responses, the government agreed in 1983 with the need to strengthen enforcement of the *Fisheries Act* by creating a specialized unit within the Fishery Officer Service. A special task group was created in 1985 (known as the General Investigations Services) to deal with more complex fishery investigations. Three teams were created, including a six-officer team based in the Lower Fraser River. The Criminal Code lists fishery officers as having peace officer status when performing duties under the *Fisheries Act.* In 1991, the penalty provisions in the *Fisheries Act* were increased.

In 1995, the John Fraser Sockeye Public Review Board concluded that the level of enforcement and capacity was grossly inadequate in 1994 and that, if permitted to continue, the attitudinal anarchy reflected in many user groups during 1994 would eventually destroy the fishery. In the board's view, the fundamental reason for DFO's existence was for the protection of the resources; to claim that enforcement could not be achieved for budgetary reasons was an abdication of the federal government's constitutional responsibility. The board recommended that enforcement be recognized once again as an essential element of the fishery management process, that an effective and credible enforcement level be re-established, that it expand its policy of non-criminal administrative sanctions, and that it establish an enforcement branch in the Pacific Region headed by a director with extensive law-enforcement experience.

Response: DFO reported that the Pacific Region's Conservation and Protection sector had been strengthened and was now led by a former RCMP superintendent. This sector was adding 15 new fishery officers, deploying resources strategically to target key problem areas in the mid-Fraser River and Johnstone Strait, and developing blitz-style enforcement strategies and targeting chronic offenders. It would expand its administrative sanctions program in 1995, enabling administrative removal of fishing privileges for serious conservation offences.

In 2003, the Standing Committee on Fisheries and Oceans recommended that DFO fund and support the activities of more fisheries officers. With respect to guardians established under the Aboriginal Fisheries Strategy, the committee recommended that

- a person convicted of a fisheries violation should not be designated as a guardian;
- DFO provide resources for guardians to complete all phases of their training;
- the monitoring and enforcement component be separated from the Aboriginal Fisheries Strategy agreements, and the guardian program be funded directly
  - to ensure stability of the program;
  - to provide autonomy to Aboriginal fisheries officers and guardians; and
- Aboriginal fishery officers and guardians (together with DFO's fishery officers) be responsible to the head of the department's enforcement branch.

Response: The government noted that DFO was reviewing budget allocations but cautioned that public demands for increased funding are numerous and cannot all be met. DFO screens out any guardian candidate with a fishery violation and does not designate individuals whose criminal history, including violations of the *Fisheries Act*, is felt to compromise their ability to function effectively as guardians. In the future, guardians will not be engaged in enforcement work. Fisheries enforcement rests with DFO and is undertaken by fishery officers in the Conservation and Protection Branch. DFO is recruiting Aboriginal fishery officers who will, with equivalent qualifications and training as regular fishery officers, play an enforcement role in Aboriginal fisheries.

In 2003, the Chamut External Steering Committee reported widespread concern about inadequate enforcement. It recommended that DFO consult with First Nations and stakeholders on enforcement issues and that partnership arrangements and protocols be developed or improved, wherever possible.

Response: DFO responded that pre-season meetings had taken place, several enforcement protocols had been completed or were under development, and a Lower Fraser River enforcement work plan was serving as the basis for discussion with stakeholders. Regular enforcement patrols were conducted throughout the season, with good compliance. Illegal fishing occurred on a regular basis throughout the summer in the Cheam fishery, and extensive work was now under way to build a better relationship with that community, with the aim of providing a long-term strategy for more co-operative fisheries management programs (including enforcement) in this area.

In 2005, the Williams Post-Season Review Committee identified large-scale unauthorized harvests as one of four likely causes contributing to the failure of the Fraser River sockeye to reach the spawning grounds in expected numbers in 2004. Catch-monitoring methods vary among the fishing sectors, and DFO's persistent budgetary constraints have obliged the department to structure its catch-monitoring initiatives on a "cost neutral" basis, with mixed success. The committee recommended that

- DFO convene a meeting of First Nations and other stakeholders to assess the province-wide state of catch monitoring and to examine budgets, personnel needs, transparency, accuracy, problem areas, and ways to improve monitoring programs;
- DFO restore resources for catch monitoring to an adequate level in commercial, recreational, and First Nations fisheries;
- DFO, First Nations, and stakeholders regularly review the status and adequacy of the province-wide catch-monitoring program;
- DFO retain ultimate authority and responsibility for auditing catch-monitoring reports and performance;
- DFO devise an annual pre-season strategy to develop some estimate of unauthorized fishing and fish harvest; and
- DFO make an estimate of total mortality, to include in the catch monitoring of all fisheries.

Response: DFO reported that, in March 2005, it had initiated a process to identify and implement appropriate fisheries-monitoring and catch-reporting improvements, consistent with its 2002 Fishery Monitoring and Catch Reporting Policy Framework. DFO agreed with the committee's call for collaboration and said that the Integrated Harvest Planning Committee had been established for intersector discussion and collaboration, which should include fishery monitoring and catch reporting. DFO agreed that properly funded catch-monitoring programs were a priority, and that it would be looking to partnerships, co-management, and cost-recovery arrangements to implement this objective fully. The 2002 policy framework will develop monitoring and reporting standards in all fisheries, and harvesters will be increasingly responsible to provide the department with required catch information. Appropriate levels of auditing of catch reports will remain a departmental responsibility. DFO fully supported the need for an annual estimate of unauthorized fishing. It was designing a program for the Fraser River with sufficient structure and rigour to better estimate total unauthorized harvest, including aircraft overflights during closed times.

The Williams Post-Season Review Committee also reported that it was consistently told that illegal fishing in the Fraser River was at a higher level than in previous years, with little or no enforcement. The committee concluded:

> Illegal activities along the South Coast, particularly in the lower Fraser River, were rampant in 2004 and … enforcement against these

> activities was lacking. DFO's lack of tidal water patrol vessels capable of overnight deployment places an obvious limitation on its enforcement ability, as does the scarcity of money and personnel to undertake adequate numbers of night time river patrols. The elimination of enforcement overflights is unfortunate and the increasing age and disrepair of patrol vehicles both limiting and dangerous.

The committee attributed much of the 1.3 million shortfall to two factors – extraordinarily high water temperatures and the illegal catch and sale of fish. The latter was a "very significant factor." It made several recommendations.

- DFO must properly enforce the *Fisheries Act* and Regulations, through measures including:
  - adequate presence to deter the concealment of over-harvesting of fish by participants from all sectors;
  - enforcement of the laws against the illegal sale of fish, both fish caught as part of the food, social, and ceremonial fishery and fish illegally harvested;
  - a system to accurately record illegal nets in the Fraser River, through the use of overflights; and
  - use of night patrols, particularly in areas where illegal fishing has been reported.
- DFO must ensure that adequate resources are available and that the budget and staffing available for enforcement are increased.
- DFO should empower user groups to provide enforcement within their own sectors.
- The law-enforcement status of conservation and protection officers, and their authority to conduct vehicle checks at roadblocks, should be reviewed.
- Pacific Region enforcement should be organized as a separate branch ultimately reporting to a senior person with enforcement experience who is a member of the Regional Management Committee.

Response: DFO did not agree that illegal fishing was rampant and out of control but agreed with the need to enforce the Act and Regulations properly. Increased enforcement resources will be provided on the Fraser River in 2005. Existing resources will be augmented by providing additional officers from other parts of the region, as well as additional overtime and operating funds, to allow for increased vessel, vehicle, and aerial surveillance patrols. Night patrols on the Fraser River will be expanded. DFO also supports an increased role for First Nations and other stakeholders in developing and implementing effective compliance programs, including an expansion of community and restorative justice techniques and new programs to promote stewardship. Low officer morale is acknowledged but is thought to reflect frustrations over resource levels, uncertainties around organizational change, and staffing instability, rather than a lack of policy direction. DFO acknowledged that, without legislative reform, fishery officers do not have

the authority to participate in roadblocks, nor do they have investigative body status. Both matters are being considered as part of the *Fisheries Act* review, and the national Conservation and Protection Compliance Review. DFO considers that the Act's penalty provisions are adequate and states that it will examine administrative sanctioning provisions as an alternative approach to penalties.

In 2005, the Standing Committee on Fisheries and Oceans made these recommendations:

- DFO should establish an enforcement branch in the Pacific Region which is separate from fisheries management. This new branch should be headed by a regional director, enforcement, with extensive law-enforcement experience, who would report to an assistant deputy minister, enforcement.
- DFO should restore the number of fishery officers in the Lower Fraser River area to the highest level of the 1994–2003 period.
- The Conservation and Protection Branch should be given all the resources necessary to carry on its enforcement activities and statutory responsibility to conserve the fishery, particularly during the fisheries' closed times.

Response: DFO would pilot a new line-reporting structure for its conservation and protection program in 2005. Field operations will report to the director of conservation and protection at the Vancouver regional headquarters (rather than through area directors), and the director will report to the regional director general (instead of the regional director of fisheries management). DFO did not commit itself to creating a separate enforcement branch, noting that the work of conservation and protection is intertwined with other fisheries management activities. However, organizational change is being analyzed as part of the current national compliance modernization initiative, to be completed by the end of 2005. There will be an increased enforcement presence on the Lower Fraser River in 2005 (although not to the 1994–2003 level), including vehicle and boat patrols and aircraft surveillance. DFO's objective is to increase compliance levels through strengthened enforcement, improved co-management with First Nations, and improved catch monitoring.

Research and identification of knowledge gaps

Recommendations respecting research and information gaps can also be found under other headings in this Part, such as "Habitat management, conservation, restoration, and enhancement."

In 1982, Dr. Peter Pearse made a series of research and information recommendations, including the following:

- DFO's research priorities should be determined by the requirements for effective management and conservation of Pacific fish resources and their habitats.
- DFO should immediately take steps to improve the quality and completeness of statistical information on catches by adopting modern data collection and processing technology, improving the methods of collecting and compiling statistics on commercial landings in co-operation with the government of British Columbia, improving techniques for compiling statistics on sport and Indian catches, and expanding voluntary logbook programs and instituting compulsory programs where more comprehensive information is required.
- DFO should strengthen its information on the composition of catches by reinstating the coast-wide sampling program for salmon catches and by expanding its programs for determining the racial composition of salmon catches.
- DFO should strengthen its programs of collecting and collating information on salmon escapements and spawning by requiring those who collect the data in the field to document the methods they use in estimating spawning, developing a central data system to systematically collate and store spawning records, developing new and consistent techniques for estimating spawning activity, and assembling historical information on salmon spawning for particular streams and publishing the results in close liaison with the intergovernmental aquatic habitat inventory program.
- In preparing its annual reviews, DFO should conduct a scientific assessment of the stocks and of the inferences drawn for management purposes. This assessment should involve summarizing research findings and collating statistical information on catches, fishing effort, escapements, and sampling; organizing a review of this information by the department's professional staff and other scientists; and preparing a statement of consolidated advice regarding the consequences of alternative management strategies for consideration by senior administrators.
- DFO should substantially expand and strengthen its program of scientific research on fish habitats, especially on the freshwater habitats of salmon, the effects of disturbances, and ways of mitigating them.
- DFO should organize a regular process for reviewing research activities and revising priorities with the advice of departmental managers and outside scientists. Each year it should report its research activities and plans for public information and for appraisal by the Pacific Fisheries Council.

Response: According to DFO's Recommendations and Responses, the government agreed in 1983 with the need to modernize DFO's stock management systems and procedures, special attention being given to acquisition and analysis of statistical data, research on and assessment of the condition of fish stocks, long-term planning for stock management, and procedures during the fishing season. After the signing of the 1985 Canada–US Pacific Salmon Treaty, DFO assumed responsibility for many pre- and post-season assessment activities.

In-season assessment of Fraser sockeye stock status and impact on the fishery became the mandate of the Pacific Salmon Commission and the Fraser River Panel.

In 1999, the Auditor General of Canada reported that DFO acknowledged that further improvements were needed in its catch, escapement, and habitat databases. The auditor general recommended that the department assess its information requirements in the areas of data collection, analysis, and management, in order to meet its long-term needs and to identify priorities under the New Direction policy.

Response: DFO concurred and stated that it was preparing assessment frameworks for all species of Pacific salmon. These frameworks would define the information required to ensure conservation and effective management, and would be used to determine priorities for allocation of resources under the New Direction policy. Work under the Canada–British Columbia Agreement on the Management of Pacific Salmon Fishery Issues had already resulted in significant improvements in salmon information management, and work to achieve further improvements would continue.

In 2003, the Standing Committee on Fisheries and Oceans recommended that DFO give high priority to research to determine the reason for the earlier than normal return of the Late-run sockeye.

Response: The government stated that studies on migration behaviour and in-river mortality of sockeye were conducted in 2003 in conjunction with the Pacific Salmon Commission and university partners. These studies are improving our knowledge of the cause or causes of mortality and the schedule of mortality level across the various timing strata (early, mid, and late) of the Late-run stocks, and they are providing information that can be used to explore management options to protect Late-run stocks while harvesting healthy stocks.

In 2003, the Chamut External Steering Committee recommended that monitoring and assessment studies be continued, to improve understanding of the effects of high spawner density (e.g., Adams River 2002) and of the migration behaviour and in-river mortality among Late-run sockeye.

Response: The government stated (as noted earlier) that studies on the migration behaviour and in-river mortality were conducted in 2003 in conjunction with the

Pacific Salmon Commission and university partners. DFO added that a recent assessment of the potential impact of "over-escapement" for 21 sockeye stocks in British Columbia was completed in 2004 by the Pacific Fisheries Resource Conservation Council, using the department's data. It concluded that "while there is evidence of a decrease in spawning efficiency at high spawning numbers, there is no evidence for anything like a 'collapse' or 'near collapse' of production following runs with very large numbers of spawners." DFO also cited several research studies (Cooke et al. 2004, and Hinch and Gardner 2009) and identified areas of future research activity.

In 2005, the Standing Committee on Fisheries and Oceans recommended that the Government of Canada support, fund, and collaborate with a scientific consortium established to study and fill the knowledge gaps related to the biology and the management of wild Pacific salmon, including:

- the impact of elevated temperatures in the Fraser River and other BC watersheds;
- the quantitative estimates of spawning fish; and
- the development of predictive models of river conditions.

Response: DFO agreed with the importance of the three priority areas identified by the committee, but noted that there is previous and ongoing research on all three. Collaborating with outside researchers is important, but research in these areas should not rely on the periodic interest of universities – logistical facilities and salmon expertise reside within the department already. In 2005, exploratory radio tagging, jointly funded by DFO and the Pacific Salmon Treaty Endowment Fund, is planned to assess the feasibility, using telemetry studies, of estimating mortality in Fraser River sockeye due to fishing and non-fishing factors. Forecasting is by nature inexact, and uncertainty will always exist. Further investment in information and data may reduce uncertainty and risk somewhat, but will not lead to perfectly accurate forecasts.