An Assessment of Fisheries and Oceans Canada Pacific Region's Effectiveness in Meeting its Conservation Mandate

Prepared for
the David Suzuki Foundation
by
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DISCLAIMER:

The opinions expressed in this report are those of the authors and not necessarily those of the David Suzuki Foundation.

In particular, the discussion of quotas, and specifically Individual Transferable Quotas (ITQs), is a matter of some controversy. Where quotas are discussed in this document, they do not implicitly mean ITQs, but more generally refer to the broader suite of quota options, including community quotas and vessel quotas. At this time, neither the authors, nor the David Suzuki Foundation, believe evidence supports the use of unrestricted ITQs as an environmentally, or socially, sustainable management tool.

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Executive Summary

This report identifies serious shortcomings and failures in the Department of Fisheries and Oceans' (DFO's) ability to meet its conservation mandate in the Pacific Region, while also recognizing some positive developments and initiatives.

DFO's conservation mandate includes responsibilities under the federal Fisheries Act, as well as responsibilities established by court decisions and by several other pieces of legislation, including the relatively new federal Oceans Act and the Species at Risk Act. The report also identifies conservation commitments made by Canada in international agreements.

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 report examines DFO Pacific Region's performance in eight areas of responsibility: science and assessment; fisheries management; enforcement; freshwater habitat management; marine ecosystem management; enhancement; species at risk, and aquaculture.

Eight core challenges appear to largely explain ineffective performance on the conservation mandate: inadequate information; lack of transparency and accountability; insufficient and misallocated budget; political influence; confusions arising from external relations and shared responsibilities with a variety of federal and provincial agencies; bureaucratic complexity; conflicting and changing mandates and direction; and weaknesses in enforcement of existing laws and regulations.

The report draws upon a wide range of recent pertinent literature, as well as the input of an expert panel and personal interviews. Central to the analysis are case studies that examine DFO's conservation record in the seven areas of responsibility.

While the research identifies some successes, overall the picture is bleak. DFO Pacific Region's ability to perform effectively has been complicated and confused by numerous recent additions and changes to its work program and responsibilities. Conservation is only one of a number of often-conflicting objectives that Pacific Region is trying to achieve. The conservation mandate appears to be honoured primarily with official language that promises action on conservation in general terms, rather than with demonstrations of specific performance against identified goals and targets.

Turning to proposed solutions, we recommend not only increased budget for Pacific Region conservation-related activities, but also structural changes that would insulate the Department from political interference with the performance of its conservation responsibilities. Clearer prioritization of funding to conservation-related activity is required, with defined targets and performance reports made readily accessible to and understandable by the public and lay audiences. Greater use of administrative enforcement remedies in conjunction with more consistent use of the criminal justice system would be more effective. We propose a program of re-structuring, re-focusing and re-building with short-term and long-term components that would improve DFO's ability and willingness to carry out its conservation mandate.

1 INTRODUCTION

This report summarizes the research and analysis that the consultant team has undertaken in its assessment of how effectively DFO Pacific Region has met its conservation mandate.

The report begins with a description of the multiple pieces of legislation, treaties, policy statements and other documents which comprise DFO's conservation mandate, in Section 3.

Section 4 of the report describes the capacity of DFO Pacific Region to deliver on the conservation mandate – highlighting pertinent organizational and budgetary considerations that affect performance.

Section 5.1 reviews previous analyses of DFO's performance on various aspects of its conservation mandate. Section 5.2 describes eight core challenges which weaken DFO Pacific Region's ability to meet its conservation mandate. We identified these core challenges after a review of recent literature, interviews with members of a panel of advisors and other experts, and a review of twelve case studies. The case studies are described in Section 5.3.

In Section 6, we present our conclusions indicating how well we believe DFO Pacific Region has met its conservation mandate. For each of the core challenges, we provide examples of positive and negative aspects of Pacific Region performance – successes and failures.

Finally, Section 7 sets out potential solutions to the problems identified through the research.

A note on terminology: When we refer to DFO or "the Department," we are usually referring to the DFO Pacific Region, which is the subject of this analysis. When we are referring to DFO at the national level, the context of the discussion makes this clear.

We interpret the term "conservation" broadly, while staying within the scope of DFO's conservation mandate as described in Section 3. We intend conservation to include:

- conservation of species diversity, abundance and natural viability, such that the species and their genetically distinct stocks or populations are self-sustaining in the wild;
- conservation of freshwater and marine habitat, such that areas on which the species depend directly or indirectly to carry out their life processes continue to provide an appropriate scale of opportunity for those processes;
- conservation of ocean and freshwater ecosystems; such that the diversity of ecosystems and interdependence within them is recognized and managed for; and
- conservation of fisheries such that they can continue to support healthy aboriginal, recreational and commercial harvesting.

2 APPROACH

The main sources of information for this research project were Web sites, literature (articles, reports, etc.), DFO budgetary records and advice from a group of experts in a Delphi Panel. Interviews were also undertaken. An analytical framework provided a conceptual guide. Organizational analysis, literature review and case studies were the main means of analyzing and presenting research results. Twelve case studies are central to the analysis; these are supported by a review of results of previous studies and assessments.

This was a research project rather than a public inquiry or a stakeholder consultation process. We anticipate ongoing discussion of findings and recommendations following publication of the report.

2.1 Focus

This research focused on DFO's performance in implementing its conservation mandate in the Pacific Region. It does not look at experience outside of this region. It does not investigate broader issues of sustainability. In particular, economic, social and cultural themes are not explored in this project.

The overall approach was to analyze DFO's performance against mandated direction for conservation, using case studies and examples that demonstrate effectiveness and challenges. Ultimately, the project aimed to focus on possibilities, going beyond the limitations of the current situation.

2.2 Research

2.2.1 Web Research

The review of pertinent materials was conducted using both print and electronic (Web site) sources. Wherever possible, current Web links to electronic sources of reference materials have been provided, in the text and appendices.

2.2.2 Review of DFO Records

Financial records were drawn from a number of sources including archived records from 1982 to 1993, information for 1990 to 2004 provided by DFO through the Access to Information Program and various published information sources.

2.2.3 Literature Review

We reviewed an extensive array of published and unpublished material, including:

- Previous reviews, evaluations and assessments reported in consultant reports, government documents, etc.
- Books

- Conference and workshop proceedings
- Journal articles (synthesis and review-level rather than primary research)
- House and Senate Committee reports and testimony, including Standing Committee reports
- Auditor-General reports, especially those of 1997 (salmon), 2001 (aquaculture) and 2004
- Internal DFO documents, as available

A list of the reference materials cited in the text and other sources that were reviewed in this research is provided at the end of the report.

2.2.4 Interviews

As part of the initial research, two of the report authors took advantage of the presence of international fisheries experts at the World Fisheries Congress in May 2004 and spoke to several delegates about this project. The theme of the Congress, "Reconciling Fisheries and Conservation," was highly pertinent to this research.

Other interviews were undertaken as needed, to fill gaps in the information base that could not be covered by the literature. Several interviewees required that their contribution be "off the record" and so they are not listed in the references for the report.

2.3 Delphi Panel

The Delphi research method involves the identification of a core group of respected experts whose expertise is tapped in a sequence of communications at intervals during the project. The function of the Delphi group is somewhat like an advisory committee, but following a particular process of consultation that can help to eliminate bias. See Kerr (2001) and Linstone and Turoff (2002) for a further description of the Delphi approach.

The members of the Delphi panel were selected to be representative of the spectrum of opinions relevant to DFO's conservation mandate. All have outstanding credentials and are widely respected individuals with a broad range of knowledge and perspectives. They included those with relevant theoretical knowledge as well as those who have practical experience. Short profiles of the Delphi members are included in Appendix 8.5.

The wisdom of the Delphi panel was solicited at two junctures: first, to obtain advice on the draft description of DFO's conservation mandate and to seek ideas for case studies; and second, to request feedback on a draft, summary version of the entire document. In both instances, advice was also sought on sources of information. Each time the Delphi panel's advice was received, amalgamated results were circulated back to panel members without attribution as to who made which comment, and panel members were invited to respond to the views of others. The research was thus informed by both initial reactions to draft material, and responses to differing opinions from Delphi panel members.

It must be emphasized, that, despite the invaluable contribution of the Delphi panel, consensus among Delphi members was not sought, and the opinions and conclusions expressed in this report are those of the authors, not the panel members.

2.4 Analytical Framework

The report investigates DFO's performance on three "objects of conservation." The stated ideals for conservation in these areas are set out in the Department's mandate, which provides direction for conservation to DFO. (We had sought to identify more specific goals for conservation within the mandate, but the mandate did not provide such a specific degree of direction.) Case studies were investigated to illustrate actual performance against the conservation mandate, looking at core challenges as well as successes. The case studies represented experience in eight areas of responsibility for DFO, Pacific Region, that are directly related to the conservation mandate. The Core Challenges that were explored through the case studies were first identified through the literature review, as explained in section 5.2 of the report.

OBJECT OF CONSER-VATION	STATED IDEAL				ACTUAL		EXPLANATION – IMPLEMENTATION OF MANDATE							
	MANDATE			CONS'N DIREC-TION	PERFORMANCE		AREAS OF RESPONSIBILITY							
	Acts	Treat-ies, etc.	Policy		Problems (diverge from mandate)	Successes (meet mandate)	Enforce-ment	Science incl. Assmt	Fresh-water Hab. Mgmt	Marine ecosystem Mgmt incl. MPAs	Enhance-ment	Fisher-ies Mgmt	SAR Recov.	Aqua-culture
SPECIES (fish, invert's, mammals)														
HABITAT (freshwater, marine)														
FISHER-IES														

Notes:

Species include fish, fish populations and fish stocks; invertebrates and mammals.
Habitat includes ecosystems.
Problems and Successes are demonstrated by case studies that illustrate performance against the three objects of conservation within the areas of responsibility.

2.5 Case Study Selection and Analysis

The twelve case studies analyzed in section 5.3 were selected almost entirely from cases suggested by Delphi panel members. They were chosen from a wide array of possible cases, to meet the following needs:

Areas of Responsibility: *The case studies should illustrate performance in the eight areas of responsibility related to the delivery of the conservation mandate.*

Objects of conservation: *The case studies should illustrate performance in the conservation of various species, habitat/ecosystems and fisheries.*

Performance: *The case studies should illustrate poor performance (problems/challenges) and good performance (successes, or models for improvement). DFO must be a key player in the case study for this learning to be possible.*

Core challenges: *The case studies should test what were identified from the literature as the key issues, problems or challenges facing DFO.*

Currency: *The case studies should be relatively recent, so as to be relevant to learning for the future, given current and changing circumstances.*

We encountered a research challenge in connection with the identification of a case study (or more than one) to illustrate performance in the area of habitat protection. Experience in this area is broad, diverse and extensive, and several previous studies have assessed DFO performance on aspects of habitat conservation. Thus, the topic of habitat (and to some extent, ecosystem) conservation is interwoven into some case studies, which also illustrate other areas of responsibility, and a twelfth "case study" which mainly summarizes results from previous assessments relevant to habitat conservation is included.

Each case study is analysed in the following steps:

- Introduction, spelling out the topic, which objects of conservation are of concern, and which areas of responsibility are illustrated;
- "The story," which lays out a chronology of what happened, focusing on DFO's role, and indicators of performance on the conservation mandate;
- Conclusions, summarizing problems and successes in the pursuit of the conservation mandate in relevant areas of DFO's responsibility; and
- Core Challenges illustrated – whether by way of successful or problematic performance.

3 DFO'S CONSERVATION MANDATE

This document describes Fisheries and Oceans Canada's (DFO's) mandate, with an emphasis on the mandate for conservation. The mandate is drawn from:

- the Canadian constitution and federal legislation (Section 3.1);
- Aboriginal law, including rights and title (Section 3.2);
- international treaties, conventions and agreements (Section 3.3); and
- policy and legislation on cross-cutting themes (Section 3.4).

The aim is to describe responsibilities that are binding – legally or through commitments stated publicly at the highest levels of the Department – rather than discretionary. The mandate is described here as a foundation for the analysis of DFO's performance in implementing its conservation mandate. This document does not attempt to provide a critical analysis of the mandate.

Section 3.5 describes pertinent memoranda of understanding and cooperative agreements that exist between federal departments and between DFO, the province of British Columbia and the Government of the Yukon, outlining their respective conservation-related responsibilities in areas where they share jurisdiction.

There are also non-conservation-related mandates that influence departmental actions – as for example the mandate to spend cautiously and to achieve defined budget targets. These are described in Section 3.6.

On its national "Mandate" Web page, DFO summarizes its long-term priorities and objectives as follows:

- Manage and Protect the Fisheries Resource**:** To maintain a biologically sustainable resource supporting self-reliant fisheries by conserving Canada's fishery resources and ensuring sustainable utilization.
- Manage and Protect the Marine and Freshwater Environment: To achieve an integrated, cohesive approach to the management of the marine and freshwater environment through stewardship and protection of productive fish habitat and reduction in the risks and impacts of oil and chemical spills in the sea.
- Understand the Oceans and Aquatic Resources: To acquire, apply and communicate knowledge on Canada's oceans, as well as on marine and freshwater resources, to support the activities of clients, partners and the operational branches of DFO.
- Maintain Marine Safety: To improve the safe use of the marine and freshwater environment in order to reduce the number and severity of incidents such as collisions and groundings, and to provide aid to the persons in distress or imminent danger, thereby minimizing loss of life and damage to property.
- Facilitate Maritime Trade, Commerce and Ocean Development: To develop the requisite policy and regulatory framework, and to provide the operational services that support commercially sustainable maritime industries.

In support of these long-term objectives, DFO is committed to:

1. strive to continuously improve relations with its clients, involving clients more effectively in key decision-making processes, information sharing and program delivery mechanisms; and

2. make managers accountable for promoting an environment that provides clear direction and fosters mutual respect, team work, and professionalism, while delivering quality service to clients; and in which all employees share responsibility for the renewal of the Department and in the development of their own careers.

Web reference: http://www.dfo-mpo.gc.ca/dfo-mpo/mandat_e.htm

3.1 Conservation Responsibilities Set Out in the Constitution and Federal Legislation

DFO's conservation mandate is mainly defined in the Constitution Act and in a number of federal statutes. Some of the statutes, such as the Fisheries Act, have been in existence for decades. Others – like the Oceans Act and Species at Risk Act – have been enacted more recently. The British Columbia Terms of Union is also relevant, as discussed below.

In terms of geographic extent, generally the federal government owns the seabed under the open ocean up to 12 nautical miles from outside shore, and controls the ocean and fisheries up to 200 nautical miles from the shore. However, because of unique circumstances having to do with the way B.C. joined Canada, the seabed of the Strait of Georgia, located between Vancouver Island and mainland British Columbia, belongs to the province. This is an exception to the general rule.

3.1.1 BC Terms of Union

British Columbia was a self-governing province or colony pre-Confederation. It brought its fisheries into Canada in 1871, via the BC Terms of Union, which provided (para. 5e) that "Canada will assume and defray the charges for the following services … Protection and Encouragement of Fisheries."

3.1.2 Constitution Act of 1867

The Constitution Act of 1867 gives the federal government responsibility for "sea coast and inland fisheries." Even in those instances where activities on provincial land affect marine ecosystems, the federal government may override provincial actions to the extent necessary to protect fish.

Web reference: http://laws.justice.gc.ca/en/const/c1867_e.html#distribution (Section 91, Item 12)

3.1.3 Department of Fisheries and Oceans Act

The Department of Fisheries and Oceans Act sets out responsibilities in general terms. It spells out the powers, duties and functions of the Minister in section 4, as follows:

4.(1) The powers, duties and functions of the Minister extend to and include all matters over which Parliament has jurisdiction, not by law assigned to any other department, board or agency of the Government of Canada, relating to:

(a) sea coast and inland fisheries;

(b) fishing and recreational harbours;

(c) hydrography and marine sciences; and

(d) the coordination of the policies and programs of the Government of Canada respecting oceans.

4.(2) The powers, duties and functions of the Minister also extend to and include such other matters, relating to oceans and over which Parliament has jurisdiction, as are by law assigned to the Minister.

Web reference: http://laws.justice.gc.ca/en/F-15/index.html

3.1.4 Fisheries Act

The Fisheries Act was originally passed in 1868. Canada's duty is to act as the trustee or steward of the fishery resource in recognition of the fact that the resource is owned by the people of Canada, not the government of Canada. Under the Fisheries Act, it is the Minister's duty to manage, conserve and develop the fishery on behalf of Canadians. The Act provides the legislative authority for management and regulation of fresh and salt water fisheries, including access, control over the conditions of harvest, regulation of the right to fish, and licensing. It also provides the legislative authority for the protection of fish and fish habitat and for enforcement of regulations related to these purposes.

The coverage of the Act is notably broad. It applies to all fish habitat and water bodies that are relevant to commercial, sport or aboriginal fisheries in Canada. The Act applies to all lands – public, private or aboriginal.

Habitat is defined broadly in the Act, to encompass areas on which fish depend directly or indirectly to carry out their life processes, including spawning, nursery, rearing, food supply and migration areas. Habitat is defined as including streamside vegetation, which gives DFO some power to affect activities adjacent to a fish-bearing stream or water body. This power is limited by related provincial powers to regulate streamside activity. Another limitation relates to the fact that only fish habitat that is part of or contributes to a fishery is protected by law. To be protected, the fish that live in the habitat or depend upon that habitat directly or indirectly must contribute to a fishery.

Web reference: http://laws.justice.gc.ca/en/F-14/index.html

Section 35: Harmful Alteration, Disruption or Destruction of Fish Habitat

Section 35, the so-called "HADD" provision (for "harmful alteration, disruption or destruction") prohibits damaging fish habitat. It reads:

> "No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat, unless that person has authorization from the Minister to do such work."

Section 35(2) allows DFO to issue habitat destruction authorizations under specified conditions.

The Canadian Environmental Assessment Act (1995) (CEAA) http://laws.justice.gc.ca/en/C-15.2/index.html states that any activity with the potential to cause significant environmental harm that involves a decision by the federal government can give rise to a CEAA environmental

assessment. Therefore, a CEAA assessment would be required before a Section 35(2) authorization may be granted. However, where HADD is not obvious, DFO often issues informal "letters of advice" and "referrals," which are not formally, legally or officially, authorizations, so CEAA would not be triggered in those cases.

For most recent available (fiscal year 2000-01) statistics on DFO authorizations and advice, environmental assessments and enforcement activity, all nationally and by region, see http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/publications/reports-rapports/ann00/annex8_e.asp

The procedures for dealing with projects that have the potential to result in habitat destruction are as follows:

- DFO and the project proponent examine possible project alternatives, such as relocation or redesign.
- If these alternatives do not exist, DFO and the project proponent examine mitigation measures that could reduce or eliminate impact on fish habitat, and if such measures are appropriate, DFO issues a "letter of advice" outlining steps that should be taken to avoid HADDs.
- If neither of the two options above solve the problem, a habitat destruction authorization will be required if the project is to proceed. These authorizations can include conditions designed to minimize impacts and will implement the "no net loss" policy which requires the construction of replacement habitat to compensate for the loss of habitat.

The No Net Loss Policy

DFO's Policy for the Management of Fish Habitat (originally 1986, updated 2001) established the No Net Loss Policy, which states that "a net gain of habitat for Canada's fisheries resources" is an explicit objective of government policy.

Web reference: http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/fhm-policy/index_e.asp

The principle states that:

> "the Department will strive to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss may be prevented."

The policy for achieving this contains four elements, set out in section 2:

> 2.1 Net Gain of Habitat
> 2.2 Fish Habitat Conservation
> 2.2.1 No Net Loss Guiding Principle
> 2.3 Fish Habitat Restoration
> 2.4 Fish Habitat Development

Procedures and guidelines have been developed for achievement of "No Net Loss." They are outlined in detail at http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/fhm-policy/chap5_e.asp

In B.C., habitat restoration took place from the 1980s to the early 2000s, using such programs as the Habitat Restoration and Salmon Enhancement Program (HRSEP), the Salmon Enhancement Program (SEP), the Fraser River Action Program (FRAP) and the Habitat Action Program. As of 2005, there is no funding available, because of the termination of these programs.

Section 36(3): The Pollution Provision

Section 36(3), "the pollution provision," prohibits deposit of harmful substances:

> "...no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water."

The provision has very wide coverage and covers all effluent discharges. It applies except where such deposit has been authorized by the Minister. Regulations have been enacted over the years that authorize some discharge in specific instances and grandfather some older industrial operations. These regulations allowing the introduction of particular harmful substances into fish habitat include:

- Pulp and Paper Effluent Regulation
- Port Alberni Pulp Mill Effluent Regulation
- Metal Mine Liquid Effluent Regulation
- Petroleum Refinery Liquid Effluent Regulation
- Chlor-Alkali Mercury Liquid Effluent Regulation
- Meat and Poultry Plants Liquid Effluent Regulation
- Potato Processing Plant Liquid Effluent Regulation

The Minister may direct a person authorized to deposit a deleterious substance to conduct sampling, analyses, tests, measurements or monitoring to determine if the deposits are being undertaken in the manner authorized.

The provisions of this section are administered by Environment Canada in cooperation with DFO. http://www.ec.gc.ca/ele-ale/policies/c_and_e_fisheries_act/main_e.asp

Most recent (fiscal year 2000-01) summary report information on Environment Canada's enforcement activities related to the pollution provisions, with national data and some Pacific region breakouts and commentary, may be found at http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/publications/reports-rapports/ann00/annex8_e.asp

A 1987 Regional Working Agreement between DFO and Environment Canada (EC) spells out the terms of cooperation between the two departments regarding the pollution control provisions of the Fisheries Act and their enforcement. EC provides technical expertise and advice on effluent treatment technology and environmental effects monitoring for permitted discharges. EC provides the single point of contact and application window for industry and provincial government on pollution matters. DFO deals with deposits of sediment from land clearing; EC deals with deleterious deposits such as spills, and fish kills. DFO provides technical expertise and advice on what is required for protection of fisheries.

Other Key Provisions of the Act Related to Conservation

The following sections of the Fisheries Act are also related to DFO's conservation mandate:

20-21 Ability to require artificial pathways: The Minister can require fishways or other forms of artificial paths that will permit fish to pass obstacles to be constructed and maintained by owners or operators of identified obstructions.

22 Requirement of minimum flows over dams, to ensure sufficient water for migration and spawning.

23-25 Limitations on fishing: Contain prohibitions against fishing during closed times or without valid leases or licences.

26(1) Ensures adequate flows in rivers and streams: "One third of the width of any river or stream and not less than two thirds of the width of the main channel at low tide in every tidal stream shall always be left open, and no kind of net or other fishing apparatus, logs or any material of any kind shall be used or placed therein."

27-29 Prohibitions against obstructing the passage of fish

30 Requirement of screening of water intakes

32 Protection of fish from destruction by means other than fishing (e.g., turbine mortality, use of dynamite)

42.1 The Minister of Fisheries and Oceans must provide an annual report to Parliament on the administration and enforcement of the habitat protection and pollution prevention provisions of the Fisheries Act.

Fisheries Regulations

The objective of achieving efficient and economic operations of fisheries is established under the authority of the Fisheries Act. The Minister of Fisheries and Oceans has absolute discretion to issue fishing licences and regulate fishing activities in a manner consistent with the Fisheries Act and the Federal government's constitutional mandate to manage and conserve the fishery.

Forms of regulation of commercial fishing include licence conditions and specific regulations providing for limits on boat licences, area closures, seasonal closures, equipment restrictions and quotas. There are also provisions for regulation of recreational and aboriginal fisheries.

Fishery (General) Regulations apply to commercial, recreational and aboriginal communal fishing and related activities across the nation. These regulations cover:

- variation of: close times, fishing quotas and size and weight limits of fish;
- documents and registrations;
- identification of fishing vessels and fishing gear;
- observers;
- assisting persons engaged in the enforcement or administration of the Act;
- fishing for experimental, scientific, educational or public display purposes; and
- fishing in waters other than Canadian fisheries waters.

Pacific Fishery Regulations, 1993 contain provisions specific to Pacific Region fisheries. These Regulations apply to commercial fisheries, fishing for tuna from Canadian vessels on the high seas and the harvesting of marine plants from Canadian fisheries waters outside of the geographical limit of the province. These Regulations do not apply to recreational fishing, taking fish from an aquaculture site, fishing for marine mammals or fishing from a foreign fishing vessel.

British Columbia Sport Fishing Regulations, 1996 apply to sport fishing in Canadian fisheries waters of the Pacific Ocean and the Province of British Columbia. The Regulations set close times, fishing quotas and size limits for all sport fisheries in B.C. These Regulations do not apply in National Parks. In the case of freshwater fisheries under the jurisdiction of the Province, although DFO has delegated freshwater fish management responsibility to the Province, it retains the enabling legislative power and passes the regulations the Province requires to carry out freshwater fish management.

Yukon Territory Fishery Regulations cover all aspects of fishing in the Yukon Territory including commercial fisheries, sport fisheries and the Inuvialuit Subsistence Fishery. These Regulations do not apply in National Parks.

Aboriginal Communal Fishing Licences Regulations cover the issuance of communal licences to aboriginal organizations. The conditions of the licence regulate communal fishing activities.

Marine Mammal Regulations apply to the management and control of fishing for marine mammals and related activities. The existing Marine Mammal Regulations prohibit the disturbance of marine mammals (whales, seals and sea otters). However, in some instances permits to kill marine mammals may be granted when they are harming fishing or fish farms. DFO Pacific Region held consultations in 2003 regarding revision of these regulations to make them more specific and informative. See http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/marinemammals/default_e.htm

Regulations on the Management of Contaminated Fisheries authorize the Regional Director-General (RDG) to close any area to fishing for a specific species of fish if the RDG has reason to believe that fish in that area are contaminated.

Pacific Fishery Management Area Regulations describe the surfline and divide the Canadian fisheries waters of the Pacific Ocean into Areas and Subareas. The Areas and Subareas are often referenced when describing fishery openings and closures.

The future direction of fisheries management will be implemented in the context of the Oceans Act, utilizing the principles of sustainable development and integrated resource management.

Web references for Pacific Region fisheries regulations are as follows:

Pacific Fishery Regulations (1993): http://laws.justice.gc.ca/en/F-14/SOR-93-54/index.html

Yukon Territory Fishery Regulations: http://laws.justice.gc.ca/en/F-14/C.R.C.-c.854/index.html

Recreational Regulations: http://www.pac.dfo-mpo.gc.ca/recfish/policy_e.htm See also – http://www.dfo-mpo.gc.ca/communic/fish_man/opera/OPF-PC_E.htm#2

Commercial Regulations: http://www.pac.dfo-mpo.gc.ca/ops/fm/toppages/actreg_e.htm

Joint Project Agreements

Joint Project Agreements (JPAs) are voluntary, negotiated, legally binding arrangements whereby DFO and parties to a fishery agree to participate in a project related to activities associated with the management and operation of that fishery. JPAs are a key component of DFO's co-management approach.

Integrated Fishery Management Plans

Integrated Fishery Management Plans (IFMPs) set the stage for co-management arrangements by ensuring transparency, establishing overall allocations between sectors and fleets, providing relevant contextual information and ensuring that clients and stakeholders are consulted on the overall goals and strategies for the management of each fishery.

Each fishery management plan is to include a section on goals and performance measures.

Policy Frameworks

Two key policies provide direction for the implementation of the Fisheries Act in the Pacific Region: the New Direction for Canada's Pacific Salmon Fisheries (1998), and the Wild Salmon Policy (most recent draft issued in December 2004). (Objectives-Based Fisheries Management, an extension of Integrated Fisheries Management Plans, has been adopted, but only on a pilot basis.)

New Direction for Canada's Pacific Salmon Fisheries

The New Direction for Canada's Pacific Salmon Fisheries (1998) outlined twelve goals and objectives, and suggested the types of criteria that might be used to determine if the goals and objectives were being met. Together these goals and objectives were regarded as signaling a shift in focus to a more regional or watershed approach to managing salmon in B.C.

Web reference: http://www-comm.pac.dfo-mpo.gc.ca/pages/release/bckgrnd/1998/bg981014a_e.htm

Goals and Objectives of *New Direction for Canada's Pacific Salmon Fisheries* (1998)

CONSERVATION

1. Conservation of Pacific salmon stocks is the primary objective and will take precedence in managing the resource.

The new conservation ethic involves ensuring that adequate numbers of salmon spawn each year, that successful reproduction takes place and that genetic diversity is maintained.

2. A precautionary approach to fisheries management will continue to be adopted.

Given uncertainties in predicting fish population levels and survival levels, a precautionary, risk-averse approach to fisheries management is essential. Salmon populations need to be maintained at sufficient levels of abundance to provide a buffer when marine survival and other conditions threaten the spawning success of the next generation.

3. Continue to work toward a net gain in productive capacity for salmon habitat in British Columbia.

It is important to recognize that salmon depend on the unique characteristics of the freshwater and saltwater habitat they spawn and live in. Specific habitat conservation and development goals will be achieved through the protection, management and restoration of fish habitat. Strategic, short-term enhancement of threatened stocks will be used to assist their survival and accelerate rebuilding.

In particular, it is important to ensure that the governments of Canada and British Columbia work together to maximize the benefits for salmon habitat. The Province has regulatory authority over a number of activities affecting marine and freshwater habitat.

Consistent with this new conservation ethic, the Minister of Fisheries and Oceans has established the Pacific Fisheries Resource Conservation Council (PFRCC). The PFRCC is an independent body reporting annually on the status of B.C.'s salmon stocks and their habitat. In creating the PFRCC, the importance of independent advice, as well as First Nations and public participation in the advisory process, is formally recognized.

4. An ecological approach will guide fisheries and oceans management in the future.

The definition and practical implementation of an ecological approach is complex and work has been initiated to clarify its application. However, it is clear that an ecosystem approach involves understanding and providing for the complex interactions between the different wildlife species and requires a move away from the current single species management. The move to an ecological approach to fisheries and oceans management will require a phased, step-wise approach, building on knowledge as it becomes available.

The establishment of Marine Protected Areas (MPAs) is one means by which objectives for ecosystem management can be fulfilled.

SUSTAINABLE USE

5. The long-term productivity of the resource will not be compromised because of short-term factors or considerations – trade-offs between current harvest benefits and long-term stock well-being will be resolved in favor of the long term.

In order to realize social and economic benefits from the Pacific salmon, a focus on the long-term sustainability of the resource is essential. This is a key component of the new direction for the salmon fisheries. Long-term sustainability of the salmon resource will enable fish to be available for harvest from year-to-year by First Nations, recreational and commercial users while satisfying the needs of present and future generations of Canadians.

6. All sectors – First Nations, recreational and commercial – will use selective methods to harvest salmon.

A key objective of sustainable use is to have all sectors use selective fishing practices to harvest strong stocks while preserving and protecting weaker stocks of salmon. Specifically, selective fishing means having the ability to avoid non-target species and stocks or, if encountered, the ability to release non-target species and stocks live and unharmed. This will require modifications to existing gear and fishing operations and may involve the introduction of alternative fishing gear and technology.

7. First Nations requirements for food, social and ceremonial purposes will continue to have first priority after conservation requirements.

The salmon resource will continue to be a source of food and cultural fulfillment for Aboriginal people in British Columbia and the Yukon. These requirements for food, social and ceremonial purposes are constitutionally protected in Section 35 of the Constitutional Act.

8. Whenever possible, the recreational fishery will be provided with more reliable and stable fishing opportunities.

Recreational fishing occupies a special place in the hearts of the many Canadians and foreign visitors who fish the rivers and coastal waters of British Columbia. This opportunity to fish for salmon for recreational purposes will be maintained and enhanced. Supporting and sustaining vibrant B.C. recreational salmon fisheries is a key part of the new direction of salmon management.

9. The commercial fishery will be a more diversified (less dependent on salmon) and economically viable sector, better able to withstand fluctuations in the cycles of the resource and the market.

The commercial salmon sector will have fewer participants, but will be more self-reliant. Investments will be made to help diversify the fishing fleet into other species, thereby reducing dependence on the salmon resource. Diversification will be based on the precautionary approach for all harvested species.

IMPROVED DECISION MAKING

10. Clear, objective and relevant information on major issues requiring decisions will be provided to the public with sufficient time and opportunity for review, comment and feedback. Periodic review of progress and achievements will be initiated to facilitate accountability for the sound management of the salmon resource and its habitat.

The environment in which stakeholders are involved in fisheries activities has changed over time. However, the institutional structure used to solicit stakeholder input has not kept pace and is outdated. There is a need for new mechanisms to better involve all stakeholders in the decision-making process. Increased public involvement in planning and management is essential to ensure sound decision making and to build public understanding and support for necessary management actions.

11. Government and stakeholders will together be responsible and accountable for sustainable fisheries.

The future salmon management regime will be based on partnerships with clients, governments and other parties.

12. Enhanced community, regional and sector-wide input to decision making will be pursued through a structured management and advisory board system.

In the future, many of the decisions related to fisheries resources and their habitat could be made through a series of regional boards. These boards could cover a geographic area containing one or more watersheds, and address a variety of issues.

Wild Salmon Policy

DFO Pacific Region has been preparing a Wild Salmon Policy since 1998. The most recent draft was issued in December 2004. It provides a framework for defining conservation objectives for naturally spawning salmon and includes direction for resource management (conservation units and reference points), habitat protection, enhancement and aquaculture. At the time of writing, consultations on the new draft policy were underway.

A Policy Framework for Conservation of Wild Pacific Salmon (2004) http://www-comm.pac.dfo-mpo.gc.ca/publications/wspframework/wsptoc_e.htm

Wild Salmon Policy Discussion Paper (2000) http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/wsp-sep/wsp/wsp-paper_e.pdf

Wild Salmon Policy Consultations (2000) http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/wsp-sep/default_e.htm

3.1.5 Species at Risk Act

The Species at Risk Act (SARA) was passed by Parliament in 2002. It came into force and effect in stages during 2003 and 2004. DFO is responsible for SARA-related activities related to marine species, including plants as well as fish and mammals. However, final responsibility for listing of marine species lies with the Minister of Environment, with DFO in a planning and advisory role.

The goal of the Act is to prevent endangered or threatened wildlife from becoming extinct or lost from the wild, and to help in the recovery of these species. It is also intended to manage species of special concern and to prevent them from becoming endangered or threatened.

Web reference: http://laws.justice.gc.ca/en/S-15.3/index.html

A portion of the funding to implement the federal strategy has been allocated to create the Habitat Stewardship Program (HSP) for Species at Risk. The HSP enables third parties (including landowners and resource users) to become actively involved in the conservation of species at risk. The program, which has been in operation since 1999, is managed cooperatively by the three federal departments with species at risk responsibilities: DFO, Environment Canada and Parks Canada. Its goals are to protect habitat and contribute to the recovery of species at risk. The program focuses on results in three main areas:

- Securing or protecting important habitat to protect species at risk and support their recovery;
- Mitigating threats to species at risk caused by human activities; and
- Supporting the implementation of other priority activities in recovery strategies or action plans, where these are in place or under development.

Federal departments, agencies and Crown corporations are able to access funding for recovery projects through the Interdepartmental Recovery Fund (IRF). This program is designed to engage federal organizations in species at risk recovery, and serves to complement efforts being supported under the Habitat Stewardship Program, and the Endangered Species Recovery Fund (ESRF).

Web reference for the HSP program: http://www.cws-scf.ec.gc.ca/hsp-pih/default_e.cfm

Web reference for the ESRF: http://www.speciesatrisk.gc.ca/support/esrf_frep/default_e.cfm

DFO is responsible for enforcing the wildlife and habitat protection sections of SARA for aquatic species. Violations can be broadly divided into two categories, involving:

a) Harm to the individuals, such as by fishing, hunting, or harvesting. For information on these violations, see the DFO Pacific Region Fisheries Enforcement site.

b) Harm to the habitat of one or more individuals, by physical destruction or pollution through economic development, business operations, or other human activity. For information on these violations, see the DFO Pacific Region Habitat Enforcement site.

DFO Pacific Region's SARA Web Page http://www.pac.dfo-mpo.gc.ca/sara/default_e.htm

3.1.6 Oceans Act

Under the Constitution Act of 1867, the Federal Government has responsibility for oceans. Generally the federal government owns the seabed under the open ocean up to 12 nautical miles from outside shore, and controls the ocean to 200 nautical miles from the shore. Because of a quirk of the way B.C. joined Canada, the seabed of the Strait of Georgia, located between Vancouver Island and mainland British Columbia, belongs to the province. This is an exception to the general rule.

The federal government is primarily responsible for regulating pollution that originates at sea. However, much of the pollution that poses a threat to the ocean comes from the land, whether in the form of run-off or waste intentionally pumped into the ocean, and is therefore primarily the

responsibility of the provinces. The federal government does have a role here as well, particularly where a threat to fish or fish habitat calls for the application of provisions of the Fisheries Act.

The primary piece of legislation governing oceans is the federal Oceans Act, enacted in 1996. It gives the government powers to develop Integrated Management Plans and designate Marine Protected Areas. It expands the emphasis of DFO's conservation mandate beyond commercial fisheries, commercially viable species and their habitat. The Act calls for integrated, ecosystem-based management of Canada's marine regions. It requires development of a national strategy. Its three pillars are sustainable development, observance of the precautionary principle and integrated management. The Minister of Fisheries and Oceans is meant to coordinate and facilitate all governmental agencies with any oceans-related mandates, including environmental protection. Web reference: http://laws.justice.gc.ca/en/O-2.4/index.html

Oceans Strategy

The Oceans Act is enabling rather than directive. It is implemented through three management programs under the umbrella of Canada's Oceans Strategy, which was released in 2002 (http://www.cos-soc.gc.ca/) and is relevant to all federal agencies involved in the oceans. The three programs that comprise the Oceans Strategy are Integrated Management, Marine Protected Areas and Marine Environmental Quality.

Parliament did not allocate new resources to the implementation of the Oceans Act when the act was passed. Instead, DFO reallocated financial resources from its existing budget to establish the Oceans Directorate and to launch MPA and ocean management pilot projects across the country (Jessen and Ban 2003).

The Oceans Action Plan is a companion document to Canada's Oceans Strategy, guiding implementation of the Strategy. In the Speech from the Throne of October 2004, the Government committed to moving forward on the Oceans Action Plan, in part by establishing a network of marine protected areas.

A Memorandum of Understanding for Implementation of Canada's Oceans Strategy in B.C. was signed in October 2004 by the Pacific Council of Fisheries and Aquaculture Ministers. It is intended to specify the respective responsibilities of the federal government, led by DFO, and the provincial government.

Marine Protected Areas

The Oceans Act authorizes the establishment of Marine Protected Areas (MPAs) and also gives DFO the role of leading and coordinating implementation of a system of MPAs. MPAs, as defined by the Oceans Act, are intended to conserve and protect unique habitats, endangered or threatened marine species and their habitats, commercial and non-commercial fishery resources (including marine mammals) and their habitats, marine areas of high biodiversity or biological productivity, and any other marine resource or habitat requiring special protection. Marine Protected Areas are to be identified as part of federal government-led Integrated Management Planning.

Under section 35 of the Oceans Act, the Minister may designate an area by regulation for special protection for the conservation and protection of: fisheries resources, including marine

mammals, endangered or threatened marine species and their habitats; unique habitats; or marine areas of high biodiversity or biological productivity.

A federal-provincial strategy for MPAs has been in the works since 1994, aiming to coordinate all federal and provincial marine protected areas programs under a single umbrella. A discussion paper was published in 1998, but no formal agreement has yet been signed. The discussion paper calls for a joint federal-provincial approach, shared decision-making with the public and building a comprehensive system of protected areas by the year 2010 (Canada and British Columbia 1998).

DFO policy and framework materials on MPAs at the national level are presented in http://www.dfo-mpo.gc.ca/canwaters-eauxcan/oceans/mpa-zpm/index_e.asp

For more information on Marine Protected Areas policy in the Pacific Region, see: http://www.pac.dfo-mpo.gc.ca/oceans/mpa/strategy_e.htm which includes: Vision and Objectives: http://www.pac.dfo-mpo.gc.ca/oceans/mpa/vision_e.htm and Marine Protected Areas: Strategy for the Pacific Coast (1998) http://www.pac.dfo-mpo.gc.ca/oceans/mpa/dispap_e.htm

Parks Canada is responsible for designating and developing National Marine Conservation Areas (NMCAs), which are similar to Marine Protected Areas in some respects, but differ from them in many ways. For example, NMCAs are meant to be representative of marine ecoregions, while Oceans Act MPAs can be established for the protection of special features. Within NMCAs, regulations under the Fisheries Act will be a key conservation tool, since the Parks Canada legislation does not include such regulatory measures.

The same principle will apply to Marine Wildlife Areas. This third type of federal Marine Protected Area will be established by Environment Canada, through the Canadian Wildlife Service.

Integrated Management

Under the Oceans Act, the Minister, in collaboration with the provincial government, must develop and implement plans for the "integrated management of all activities or measures in or affecting estuaries, coastal waters and marine waters..."

Integrated management is to be implemented through the Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada (July 2002). This management program, under the Oceans Strategy, is intended to foster discussion about integrated management approaches in Canada's oceans community. It sets out policy in the legislative context, together with concepts and principles that will underpin the implementation of new integrated management approaches to oceans governance.

Web reference: http://www.cos-soc.gc.ca/doc/pdf/IM_e.pdf

For a description of inter-agency research on integrated coastal zone management, see http://www.durable.gc.ca/group/coastal-zone/index_e.phtml

3.1.7 Navigable Waters Protection Act

The primary purpose of the Navigable Waters Protection Act (NWPA) is protection of the public right of navigation and regulation of structures that interfere with navigation such as dams, bridges and piers. The act requires approval from the Canadian Coast Guard before any work is "built or placed in, on, over, under, through or across any navigable water." These approvals trigger assessments under the Canadian Environmental Assessment Act if they potentially interfere with navigation. The NWPA has become a fundamental tool used in conservation and habitat protection, because of its role as a "law list" trigger for environmental assessments under CEAA.

Web reference: http://laws.justice.gc.ca/en/N-22/index.html

For the purposes of the law, navigable waters include virtually every channel, stream, river or canal that can be navigated by a boat. This includes streams that can be navigated by a kayak for a short time of the year. Navigable waters thus include almost all parts of the ocean, and most rivers, lakes and streams. They border on areas of particular biological productivity, littoral areas and riparian areas.

For more information on the Navigable Waters Protection Division of DFO in the Pacific Region (also known as the Canadian Coast Guard or CCG), see http://www.pacific.ccg-gcc.gc.ca/nwpd-lpen/index_e.htm

As of April 2004, responsibility for final NWPA decisions was moved from DFO back to Transport Canada, though DFO staff will still review NWPA applications. NWPA had been within DFO since 1998. A 1995 Memorandum of Agreement currently spells out the details of cooperation between DFO and Transport Canada in the areas where they cooperate.

3.1.8 Canada Shipping Act

Under the Canada Shipping Act, responsibilities for dealing with marine pollution are shared between the Minister of Transport and the Minister of Fisheries and Oceans. In particular, those sections dealing with prevention of oil spills and preparedness and response to oil spills are administered by the Minister of Fisheries and Oceans. The Minister may also take specified actions in the case of discharge of pollutants from ships. Regulations under the Shipping Act also place limits on ship speed and engine size and restrict use of boats in some waters. These can be used to protect habitat from interference by boats and boaters. Part 8 contains provisions on pollution prevention that are the responsibility of DFO. Shipping Act regulations also limit discharge of vessel sewage in several bays and lakes in B.C. that are particularly sensitive to pollution.

Web reference: http://laws.justice.gc.ca/en/S-9/index.html

3.2 Aboriginal Law, Including Rights and Title

Aboriginal and treaty rights are recognized and confirmed by Section 35 of the Constitution Act of 1982. In DFO activities, they are implemented through the Aboriginal Fisheries Strategy (AFS). The AFS seeks to provide for the effective management and regulation of the Aboriginal fisheries and to ensure that the Aboriginal right to fish is respected, through negotiation of

mutually acceptable and time-limited Fisheries Agreements between DFO and Aboriginal groups. DFO issues communal fishing licenses to First Nations groups, allowing them to fish for food, social and ceremonial purposes.

The AFS applies only where Canada is responsible for managing fisheries. The Strategy provides for appointment of First Nations Fisheries Guardians who may take over some of DFO's responsibilities for monitoring compliance with the Fisheries Act.

For additional Aboriginal Fisheries Strategy discussion, see: http://www.dfo-mpo.gc.ca/communic/fish_man/afs_e.htm

Recent Supreme Court decisions have clarified aboriginal fishing rights. The Sparrow (1990),Van der Peet (1996), Gladstone (1996), Nikal (1996), Marshall I (September 1999) and Marshall II (November 1999) decisions establish the principle that conservation must be the over-riding priority in fisheries management, and that the conservation mandate goes beyond merely preventing extinction to include a positive duty to increase fish populations. DFO's Marshall Response Initiative describes the ways in which the Department is responding to the requirements of these court decisions.

Web reference: http://www.dfo-mpo.gc.ca/media/backgrou/2004/hq-ac10a_e.htm

Other court decisions that affect DFO's conservation mandate vis a vis First Nations include the Delgamuukw and Saanichton Marina cases. In terms of its conservation implications, the Delgamuukw case limits First Nations' use of lands (including fisheries), for example, to prevent destruction. It also asserts that the Government of Canada needs to consult with First Nations regarding actions that affect aboriginal rights and in some cases may require consent. The Saanichton Marina case establishes that the priority of aboriginal right to fish extends to the protection of the habitat that fish depend upon.

The recent Haida and Taku cases have further spelled out the government's duty to consult, where First Nations and their rights are involved.

Web references:

Haida: Haida Nation v. British Columbia (Minister of Forests) (2004)

http://www.lexum.umontreal.ca/csc-scc/en/rec/texte/2004scc073.wpd.txt

Taku: Taku River Tlingit First Nation v. British Columbia (2004)

http://www.lexum.umontreal.ca/csc-scc/en/rec/texte/2004scc074.wpd.txt

In addition to court cases, provisions in modern treaties have a direct bearing on the administration of the Fisheries Act, for example the Joint Fisheries Committee model in the Nisga'a Final Agreement.

3.3 International Treaties, Conventions and Agreements related to Conservation

The language of a number of international treaties, conventions and agreements to which the Canadian government is a party speaks to conservation of fish, fisheries and aquatic resources. Some of these treaties, conventions and agreements are multilateral, involving multiple nations. Others are bilateral, with the United States and, in one instance, Mexico. These treaties and

international agreements only become part of DFO's legal conservation mandate if they have been implemented through legislation. They are not self-executing. Nevertheless, they represent Canadian obligations that are often referred to in official DFO statements as guiding policy and decision-making.

In this section we describe the key provisions of four key multilateral agreements, executed through the United Nations, and two bilateral agreements, all of which relate to DFO's conservation mandate. We also summarize Canadian institutional structures for implementing or responding to these international agreements.

3.3.1 Multilateral treaties, conventions and agreements

UN Convention on Biological Diversity

The Multi-National Strategy

At the 1992 Earth Summit in Rio de Janeiro, world leaders agreed on a comprehensive strategy for "sustainable development" – meeting our needs while ensuring that we leave a healthy and viable world for future generations. One of the key agreements adopted at Rio was the Convention on Biological Diversity (CBD). This pact among the vast majority of the world's governments sets out commitments for maintaining the world's ecological underpinnings as economic development proceeds. The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits from the use of genetic resources.

Web reference: www.biodiv.org

The Canadian Biodiversity Strategy

Canada's Biodiversity Conservation Office (BCO) is responsible for implementing Canada's response to the international biodiversity convention. Under the guidance of the BCO, a federal-provincial-territorial working group was charged by the Federal, Provincial and Territorial Ministers responsible for Forestry, Parks, Environment and Wildlife with developing the Canadian Biodiversity Strategy. Completed in 1996, it has since become a guide for all jurisdictions in implementing the Convention in Canada.

Web reference: www.bco.ec.gc.ca

The Strategy presents a vision for Canada of:

> "A society that lives and develops as a part of nature, values the diversity of life, takes no more than can be replenished and leaves to future generations a nurturing and dynamic world, rich in its biodiversity."

In support of this vision, the Strategy also presents a series of guiding principles that provide a foundation for implementing its strategic directions.

The Strategy provides a framework for action at all levels that will enhance our ability to ensure the productivity, diversity and integrity of our natural systems and, as a result, our ability as a nation to develop sustainably. It promotes the conservation of biodiversity and the sustainable use of our biological resources, and describes how we will contribute to international efforts to implement the Convention.

The Strategy's five goals are:

- conserve biodiversity and use biological resources in a sustainable manner;
- improve our understanding of ecosystems and increase our resource management capability;
- promote an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner;
- maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources; and
- work with other countries to conserve biodiversity, use biological resources in a sustainable manner and share equitably the benefits that arise from the utilization of genetic resources.

Web reference: http://www.bco.ec.gc.ca/en/document/national_reports/cbs_e.pdf

Elements of the Biodiversity Strategy Specific to Aquatic Resources

The Strategy contains 13 elements, described as "Strategic Directions," which are specific to aquatic resources:

1.51 Assess current and proposed major government aquatic resource policies and programs to ensure that ecological, economic, social and cultural objectives are considered.

1.52 Use objective criteria to select sites for restoration and rehabilitation, and restore or rehabilitate degraded aquatic ecosystems where practical.

1.53 Implement biological and ecological inventory, monitoring programs and classification systems to determine appropriate biodiversity conservation measures and provide a framework for managing aquatic resources on a sustainable basis.

1.54 Increase our understanding of the structure, function and composition of aquatic ecosystems to enhance conservation and management practices.

1.55 Enhance efforts to conserve aquatic biodiversity by protecting: species and ecosystems at risk, endemic species, vulnerable spawning areas and unique and representative ecosystems.

1.56 Establish reserves to conserve aquatic biodiversity and contribute to networks of national and international protected areas in accordance with the strategic directions provided in the section on protected areas of this Strategy.

1.57 Develop training programs to promote the use of equipment and harvesting procedures that eliminate, or reduce to acceptable levels, the adverse impacts on populations, species, habitats and ecosystems, including the capture of undersized fish, incidental catch, and habitat destruction.

1.58 Reduce to acceptable levels, or eliminate, adverse impacts of species introductions on aquatic biodiversity resulting from aquaculture projects, fisheries enhancement programs and interbasin transfers of water and organisms.

1.59 Investigate the use of alternative aquatic resource management mechanisms to enhance the integration of social, cultural, economic and ecological objectives.

1.60 Participate in international fisheries conservation efforts to develop and encourage the implementation of ecological management approaches, and to develop sustainable use agreements.

1.61 Conserve ocean-based fisheries resources by:

a) taking effective action to address foreign overfishing outside Canada's 200 mile limit;

b) improving the enforcement of existing rules within the Northwest Atlantic Fisheries Organization (NAFO); and

c) enhancing international collaboration in the development of conservation/sustainable use policies by building on discussions at the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks.

1.62 Support the development of international agreements to encourage the development of biological reference points in fisheries management that provide a basis for the conservation and sustainable use of harvested species.

1.63 Enhance communication with those who possess traditional knowledge to improve information sharing, and to promote the conservation of aquatic biodiversity and the sustainable use of aquatic biological resources.

1.64 Maintain or develop in situ and ex situ mechanisms to support the conservation of biodiversity and the sustainable use of aquatic biological resources by:

a) determining and acting upon federal, provincial, territorial, regional and international priorities for the conservation of aquatic biological resources, research and training, and the establishment of new facilities; and

b) determining federal, provincial, territorial, regional and international priorities for ex situ aquatic biological resources, facilities, research and training.

Invasive Species

The objective of control or elimination of alien organisms was established in 1995 as part of Canada's Biodiversity Strategy. Testimony of the Commissioner of the Environment and Sustainable Development in 2003 before the Standing Committee on Fisheries and Oceans indicated that little progress had been made on this objective since 1995. He noted that the needed Action Plan "is the responsibility of Environment Canada. But setting clear, results-based goals, allocating the necessary resources, implementing the plan, and applying existing policies and legislation are the responsibilities of various departments, including Fisheries and Oceans Canada, and Transport Canada." Reference for this testimony and for discussion of the multi-agency mandate(s), with B.C. examples, is http://www.oag-bvg.gc.ca/domino/other.nsf/html/03fish01_e.html

See also House Standing Committee on Fisheries and Oceans (2003): Aquatic Invasive Species: Uninvited Guests http://www.parl.gc.ca/InfoComDoc/37/2/FOPO/Studies/Reports/foporp04-e.htm

UN (FAO) Code of Conduct for Responsible Fisheries

The Multi-National Code of Conduct

The UN (FAO) Code of Conduct for Responsible Fisheries, adopted in 1995, is voluntary and has the following objectives:

- establish principles, in accordance with the relevant rules of international law, for responsible fishing and fisheries activities, taking into account all their relevant biological, technological, economic, social, environmental and commercial aspects;

- establish principles and criteria for the elaboration and implementation of national policies for responsible conservation of fisheries resources and fisheries management and development;
- serve as an instrument of reference to help States to establish or to improve the legal and institutional framework required for the exercise of responsible fisheries and in the formulation and implementation of appropriate measures;
- provide guidance which may be used where appropriate in the formulation and implementation of international agreements and other legal instruments, both binding and voluntary;
- facilitate and promote technical, financial and other cooperation in conservation of fisheries resources and fisheries management and development; promote the contribution of fisheries to food security and food quality, giving priority to the nutritional needs of local communities; promote protection of living aquatic resources and their environments and coastal areas;
- promote the trade of fish and fishery products in conformity with relevant international rules and avoid the use of measures that constitute hidden barriers to such trade;
- promote research on fisheries as well as on associated ecosystems and relevant environmental factors; and provide standards of conduct for all persons involved in the fisheries sector.

Web reference: http://www.fao.org/DOCREP/005/v9878e/v9878e00.htm

The Canadian Code of Conduct for Responsible Fishing Operations

Canada has proposed a separate Canadian Code of Conduct for Responsible Fishing Operations. The Canadian Program for Responsible Fishing is the implementing vehicle for this Code. Its proposals originate with the fishing industry. They come from fishers, companies, industry associations, unions, fisheries institutes and others involved in the fishery.

The need for the Canadian Code of Conduct for Responsible Fishing Operations was identified several years ago by representatives of the Canadian fishing industry. Industry participants realized that such a Code would have to be compatible with the FAO Code, but were firm in their belief that it should reflect the specific needs and conditions of the varied fisheries in this country.

The Canadian Code, currently in preparation, will consist of two major parts:

- Part I will provide an introduction and understanding of the Code, including the basic principles that support the development of the Code and the goal of sustainable fisheries.
- Part II will outline the guidelines for fishers for the protection of the resource and environment, fishing gear, vessels, access and enforcement, cooperation/partnerships, education and research, and public awareness.

Web reference: http://www.responsiblefisheries.com/fish_english/index2.html

For additional commentary on the status of the Canadian responsible fishing initiatives, see http://www.dfo-mpo.gc.ca/communic/fish_man/resp98/index_e.htm

UN FAO International Plan of Action for the Management of Fishing Capacity (IPOA-CAPACITY)

This voluntary international plan of action, adopted in 2001, was developed in the context of the Code of Conduct for Responsible Fisheries.

The immediate objective of the International Plan of Action for the Management of Fishing Capacity (IPOA-CAPACITY) is for States and regional fisheries organizations to achieve worldwide, not later than 2005, an efficient, equitable and transparent management of fishing

capacity. Among other things, States and regional fisheries organizations confronted with an overcapacity problem, where capacity is undermining achievement of long-term sustainability outcomes, should endeavour initially to limit at present level and progressively reduce the fishing capacity applied to affected fisheries.

The objective of the IPOA-CAPACITY may be achieved through a series of actions related to five major strategies:

- the conduct of national, regional and global assessments of capacity and improvement of the capability for monitoring fishing capacity;
- the preparation and implementation of national plans to effectively manage fishing capacity and of immediate actions for coastal fisheries requiring urgent measures;
- the strengthening of regional fisheries organizations and related mechanisms for improved management of fishing capacity at regional and global levels;
- immediate actions for major transboundary, straddling, highly migratory and high seas fisheries requiring urgent measures.
- When it has been found that a national plan to manage capacity is not necessary, States should ensure that the matter of fishing capacity is addressed in an ongoing manner in fishery management.

The management of fishing capacity should be based on the Code of Conduct for Responsible Fisheries and take into consideration the following major principles and approaches:

- Participation
- Phased implementation
- Holistic approach
- Conservation Priority
- New technologies
- Mobility
- Transparency
- Participation

Web reference:
http://www.fao.org/figis/servlet/static?dom=org&xml=ipoa_capacity.xml&xp_banner=fi

United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks

This Agreement is generally known as the United Nations Fishing Agreement, or UNFA. It came into effect in 2001 to provide a framework for the conservation and management of straddling fish stocks and highly migratory fish stocks in high seas areas regulated by regional fisheries organizations. It provides for the obligation to use the precautionary approach and the ecosystem approach when managing these fisheries on the high seas. It obligates States to minimize pollution, waste and discards of fish. It reiterates obligations of States to control the fishing activities of their vessels on the high seas. The States party to the Agreement have the right to monitor and inspect vessels of the other state parties, to verify compliance with internationally agreed fishing rules of regional fisheries organizations such as the Northwest Atlantic Fisheries Organization (NAFO) and the International Commission for the Conservation of Atlantic Tunas (ICCAT). Finally, UNFA provides a compulsory and binding dispute settlement mechanism to resolve conflicts in a peaceful manner.

From the west coast perspective, UNFA has also served as a model for the creation of the "Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean." Though not yet approved, this is considered a good agreement for Canada as it sets the standards for the conduct of Canadian fisheries on the high seas, such as the albacore fishery, and adopts the precautionary type approach of UNFA.

3.3.2 Bilateral Treaties and Agreements

Pacific Salmon Treaty

This treaty creates an international Pacific Salmon Commission (PSC), which is responsible for ensuring that salmon are conserved to "achieve optimum production" and for allocating the amount of fish to be taken between the U.S. and Canada. The treaty was signed in 1985; in 1999, a Canada-U.S. agreement was signed, which outlines operating responsibilities under the treaty. Technically, this agreement is an annex to the treaty.

Conservation is the guiding principle of the Treaty. It places conservation obligations on Canada and the U.S. and sets out the manner in which the Commission and the Fraser River Panel manage the Fraser River fishery. The Panel's membership includes fishermen as well as representatives of governments and fishing groups. The Commission and the Panel aim to operate in an open and transparent manner that contributes both to conservation and to orderly management of salmon stocks.

Article III of the Treaty sets out the conservation principle that guides and undergirds the Treaty: "With respect to the stocks subject to their Treaty, each party shall conduct its fisheries and salmon enhancement programs so as to:

(a) prevent overfishing and provide for optimum production; and

(b) provide for each party to receive benefits equivalent to the production of salmon originating in its waters."

Article IV on the Conduct of Fisheries spells out the annual information requirements under the Treaty, as follows: "Each year the State of origin shall submit preliminary information for the ensuing year to the other Party, and to the Commission, including:

(a) the estimated size of the run;

(b) the interrelationship between stocks;

(c) the spawning escapement required;

(d) the estimated total allowable catch;

(e) its intentions concerning management of fisheries in its own waters; and

(f) its domestic allocation objectives, whenever appropriate.

Much of the Canadian information base on which the Pacific Salmon Treaty relies is developed by the Pacific Scientific Advice Review Committee (PSARC). PSARC is the regional body responsible for providing review and evaluation of scientific information on salmon stocks and their habitat. PSARC was restructured in 1999, when a Habitat sub-committee was added. The Committee had previously been named the Pacific Stock Assessment Committee.

Web reference: http://www.psc.org/Treaty/Treaty.pdf

Agreement on Environmental Cooperation (NAFTA)

This 1994 agreement between Canada, the U.S. and Mexico is also known as the environmental side agreement to the North American Free Trade Agreement (NAFTA). It is technically a tri-lateral agreement, because Mexico is also a party. The agreement creates the North American Commission for Environmental Cooperation (CEC). This is a commission with members from all three countries charged with coordinating environmental protection between the three jurisdictions and with investigating citizens' complaints that a country's environmental laws are not being enforced. The Commission has only fact-finding powers, not the power to recommend or impose sanctions.

3.3.3 Other International Institutions

A variety of other international institutions have conservation-related responsibilities. DFO represents Canada's interests in fisheries matters on such international bodies as:

International Joint Commission www.ijc.org, dealing with Columbia River issues and invasive species issues;

International Pacific Halibut Commission www.iphc.washington.edu, implementing the Pacific Halibut Convention; and the

North Pacific Anadramous Fish Commission www.npafc.org, which deals with prevention of drift net fishing for salmon on the high seas, and engages in related data collection and analysis activity.

3.4 Policy and Legislation on Cross-cutting Themes

DFO is required to report on how it is implementing a sustainable development strategy in all of its operations. It is also required, by a number of international agreements and pieces of legislation and policy frameworks, to apply the precautionary principle and approach in its activities generally. This section describes these requirements and activities being undertaken to comply with them.

3.4.1 Sustainable Development Policy (Auditor-General Act)

The role of the Commissioner of the Environment and Sustainable Development is to assist Parliament in its oversight of the federal government's efforts to protect the environment and foster sustainable development, by providing parliamentarians with objective, independent analysis and recommendations. Traditionally the Office of the Auditor-General has conducted audits that look at economy, efficiency and effectiveness of government activities – known as the three "Es." With the amendments to the Auditor-General Act, "environment" formally becomes the fourth "E." The Auditor-General must now take all four elements into consideration when deciding what to report to the House of Commons.

Web reference: http://laws.justice.gc.ca/en/A-17/text.html

DFO is required to report to the Commissioner on Environment and Sustainable Development, describing how it is integrating sustainable development principles across its mandate.

The department's first such report was completed in 2001: "Sustainable Development Strategy 2001-2003: Building Awareness and Capacity: An Action Plan for Continued Sustainable Development 2001-2003." http://www.dfo-mpo.gc.ca/sds-sdd/index_e.htm This report outlined an Action Plan with five general goals, associated with which were 41 planned activities covering the full range of departmental operations.

In 2004, DFO issued a Progress Report on its 2001-2003 Strategy. www.dfo-mpo.gc.ca/sds-sdd2004/index_e.htm In that progress report, it noted that its next Sustainable Development Strategy Report was in preparation and expected to be tabled in Parliament in 2004-2005.

The Auditor-General and the Commissioner for Sustainable Development do not provide authority for DFO or for its conservation goals. Rather, they evaluate and measure DFO's achievement of its mandates and goals. The House of Commons Standing Committee on Fisheries and Oceans performs a similar review and evaluation function, as does – in the Pacific Region – the Pacific Fisheries Resource Conservation Council (PFRCC).

3.4.2 Precautionary principle and approach

Canada is committed to application of the precautionary principle and approach by virtue of its assent to several international agreements. These include:

- UN Rio Declaration on Environment and Development and the associated UN Convention on Biological Diversity
- UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks
- UN FAO Code of Conduct for Responsible Fisheries

Canadian legislation and policy frameworks also call for application of the precautionary principle and approach:

- Canadian Environmental Assessment Act (CEAA)
- DFO Aquaculture Policy Framework
- Oceans Act and Oceans Strategy

The statements of the principle in these international agreements and in legislation and policy frameworks have been supplemented by an initiative of the Privy Council Office's (PCO) Regulatory Affairs Directorate. This initiative is seeking to define "a comprehensive framework for application of the precautionary approach and precautionary principle in government activities," and to achieve coherent and cohesive implementation of the precautionary approach with particular regard to federal domestic and international laws, policies and treaties in areas where science is implicated.

Web reference: http://www.pco-bcp.gc.ca/raoics-srdc/docs/precaution/Discussion/discussion_e.pdf

See also http://www.nrcan-rncan.gc.ca/sd-dd/pubs/pa_e.html and

http://www.durable.gc.ca/group/approach/index_e.phtml

DFO held a workshop in 2001 to determine when and how to implement the precautionary approach in assessments and advice. Shelton and Rivard (2003) outline the recent history of DFO's attempts to come to grips with the meaning and application of the precautionary principle and approach.

Web reference: http://www.nafo.ca/publications/SCDocs/2003/resdocs/scr03-001.pdf

3.5 Cooperative Agreements and Structures

Some mandates call for shared responsibility between DFO and other federal departments. In some areas for which DFO has responsibility, the provincial government has parallel or related responsibility. In these instances, effective performance requires that there be combined, harmonized efforts between federal departments or between two or more levels of government. This section describes some of the formal agreements and structures that have been established to this end. These agreements and structures are not part of the conservation mandate, but rather outline how mandate responsibilities are to be carried out.

Federal-Provincial Cooperation

In addition to the Memoranda of Understanding or Agreements described in earlier sections, DFO, the B.C. provincial government and the Government of the Yukon cooperate on a number of other issues and subjects. Additional memoranda of understanding and agreements relating to conservation, which spell out the responsibilities of the respective participants, are described below.

The Canada-B.C. Agreement on the Management of Pacific Salmon Fishery Issues

The Canada-B.C. Agreement on the Management of Pacific Salmon Fishery Issues was established in 1997 through a Memorandum of Understanding. It is intended to deal with the overlap of interests and jurisdictions between the federal and provincial government. The Agreement has four sections:

- Policy Development: Creates a Canada-B.C. Council of Fisheries Ministers, which is to explore areas of cooperation between the two governments on salmon fisheries and to facilitate communication on the development of policies by both governments, especially regarding the allocation of salmon by the federal government.
- New Structures: The Pacific Fisheries Resource Conservation Council (PFRCC) is created to advise the Council of Fisheries Ministers on conservation and sustainable use of salmon. A Fisheries Renewal Advisory Board is established to coordinate restoration and enhancement of salmon habitat.
- Salmon and Habitat Protection: The governments agree to work together to protect salmon habitat and manage salmon stocks. The two levels of government later signed the Canada-B.C. Fish Habitat Management Agreement (2000) in furtherance of this objective. That agreement, executed between DFO, B.C. Ministry of Agriculture, Food and Fisheries and B.C. Ministry of Water, Land and Air Protection, provides for improved coordination between the two levels of government on projects designed to improve fish habitat protection in the province. The agreement is intended to reduce duplication, increase coordination, and develop co-operative arrangements related to fish habitat.
- Industry and Community Development: The governments agree to work together to promote development of the salmon fishing industry and salmon-dependent communities.

Web reference: http://www-comm.pac.dfo-mpo.gc.ca/publications/mou/toc.htm

Federal-Provincial Introductions and Transfers Committee

The Federal-Provincial Introductions and Transfers Committee was formed with a Memorandum of Understanding that included: Department of Fisheries and Oceans; the B.C. Ministry of Environment, Lands and Parks (now Water, Land and Air Protection) and the B.C. Ministry of Agriculture, Food and Fisheries.

It is a technical committee whose primary role is to advise the above agencies on fish introduction and transfer issues. It meets at least four times per year, and consists of up to six members (two from each of DFO and the appropriate provincial ministries).

Web reference: http://www-heb.pac.dfo-mpo.gc.ca/intro_trans/transfers_e.htm

Canadian Council of Fisheries and Aquaculture Ministers

The Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) was established through the 1999 Agreement on Inter-jurisdictional Cooperation. Membership comprises the federal, provincial and territorial Ministers with responsibilities for fisheries and aquaculture. The Council meets annually and has established several working groups to address specific topics of mutual interest such as freshwater fisheries management and an aquaculture development strategy.

Web references:

2002 Annual Meeting: http://www.aquaculture.ca/English/CCFAM/CAIA_Press3.html
http://www.dfo-mpo.gc.ca/media/speech/2002/20020926_e.htm
2003 Annual Meeting: http://www.dfo-mpo.gc.ca/media/newsrel/2003/ccfam-ccmpa_e.htm

2004 Annual Meeting: http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2004/nr052_e.htm

Pacific Council of Fisheries and Aquaculture Ministers

This Council was established in 2003 by B.C. and Canada to strengthen co-operation and co-ordination between the federal government and the government of B.C. on the management of Pacific fisheries, oceans, aquaculture and aquatic habitat issues. It was expanded to include the participation of the Government of the Yukon.

At the initial meeting, the ministers identified areas of responsibility and issues and tasked their officials to develop a work plan to address them. The work plan includes:

- Receiving and reviewing the recommendations of the Joint Task Group (Pearse-McRae) on Post-Treaty Fisheries;
- Completing the Memorandum of Understanding for Implementation of Canada's Oceans Strategy (COS) in B.C.;
- Streamlining aquaculture site application review processes; and,
- Habitat management – to achieve a streamlined and balanced approach to regulatory reviews.

Web reference: http://www2.news.gov.bc.ca/nrm_news_releases/2003AGF0030-001141.htm#

3.5.1 Federal-to-federal cooperation

There are other examples of federal-to-federal cooperation in addition to those noted above, as between DFO and Environment Canada in connection with the pollution provisions of the Fisheries Act and the enforcement of CEPA, and between DFO and Transport Canada in connection with navigable waters protection and invasive species. These include the following.

The "5NR" Memorandum of Understanding

This memorandum of understanding, executed in 1995, encourages collaboration and cooperation between the five federal departments dealing with natural resource issues, the so-called "5NR" – Agriculture and Agri-Food Canada, Environment Canada, Fisheries and Oceans Canada, Health Canada and Natural Resources Canada – in applying federal science and technology to sustainable development challenges.

Web reference: http://www.durable.gc.ca/about-nous/index_e.phtml

Inter-departmental Working Group on Ecosystems Objectives

Reference is made to this federal Working Group in DFO's most recent Sustainable Development Strategy document, the Progress Report on its 2001-2003 Strategy. www.dfo-mpo.gc.ca/sds-sdd2004/index_e.htm. However, there is no readily accessible information on it or its work.

3.6 Mandates Not Directly Related to Fisheries or Conservation

DFO is governed by some mandates which are not directly related to conservation of species, habitat or fisheries but which have implications for conservation. Key Acts and policies of this type are described here.

3.6.1 Financial Administration Act

DFO, like all federal departments, is governed by the provisions of the Financial Administration Act, which calls for wise use of and accountability for government budgets.

Web reference: http://laws.justice.gc.ca/en/F-11/58516.html#rid-58520

The Minister reports annually to Parliament on the administration and enforcement of the fish habitat protection and pollution prevention provisions of the Act.

3.6.2 Fishing and Recreational Harbours Act

This Act specifies that DFO is responsible for regulating the use, management and maintenance of certain harbours, as defined in schedules. These are typically fishing and boating harbours, rather than commercial ports.

Web reference: http://laws.justice.gc.ca/en/F-24/index.html

3.6.3 National Energy Board Act

The National Energy Board Act is the primary federal legislation governing energy activities in Canada. DFO may have responsibilities related to energy projects or proposals that might impinge on its areas of jurisdiction.

Web reference: http://laws.justice.gc.ca/en/N-7/index.html

3.6.4 Federal Aquaculture Policy

Federal aquaculture policy is not part of DFO's conservation mandate. The manner in which it is being currently implemented often conflicts with conservation objectives; thus it is relevant to the analysis at hand.

The Federal Aquaculture Development Strategy was promulgated in 1995 by then-Fisheries Minister Tobin as a priority of the federal government. DFO was given lead agency status in implementing it and was charged to cooperate with industry and provincial governments in doing so. This strategy was established as a matter of policy direction, without enabling legislation.

Web reference: http://www.dfo-mpo.gc.ca/media/newsrel/1995/hq-ac14_e.htm

In B.C., responsibility for aquaculture-related activities is shared with the provincial government. In 1988, the federal government (lead agency, DFO) and the province of British Columbia (lead agency, Ministry of Agriculture, Food and Fisheries) signed a Memorandum of Understanding (MOU) dealing with aquaculture. The MOU sets out the agreement between the two levels of government, dividing the responsibilities for the administration and regulation of the aquaculture industry.

The federal government, through DFO, created the Office of the Commissioner for Aquaculture (OCAD). The office had the mandate to identify an appropriate federal role in aquaculture and to suggest related implementation strategies and programs.

Web reference: http://ocad-bcda.gc.ca/emandate.html

The office issued a number or reports, most recently "Achieving the Vision" and "Recommendations for Change" in late 2003 and early 2004, respectively. These reports proposed shared responsibility for aquaculture between DFO and Agriculture and Agri-Food Canada, on the grounds that aquaculture shares important characteristics with terrestrial farming or agriculture.

Web references: http://ocad-bcda.gc.ca/egreetings.html

In the spring of 2004, the OCAD office was folded into the DFO organizational structure.

3.7 DFO's Conservation Mandate in the Pacific Region

3.7.1 Key Sources of the Conservation Mandate

The following table lists the laws and policies described above that are the source of the conservation mandate, and links them to the three "objects of conservation" within DFO's responsibility. These objects of conservation are species, including fish, fish stocks and other

species (primarily with respect to biodiversity); habitat or ecosystems – both freshwater and marine; and fisheries (primarily with respect to sustainable harvesting).

Table 1: Overview of the Conservation Mandate

Source of Conservation Mandate	Object of Conservation				
	SPECIES/STOCKS		HABITAT/ ECOSYSTEMS		FISHERIES
	Fish	Mammals etc.	Fresh-water	Marine	
Federal Legislation					
Fisheries Act	v		v	v	v
New Direction for Canada's Pacific Salmon Fisheries (policy document)	v		v		v
Species at Risk Act	v	v	v	v	
Oceans Act	v	v		v	v
Canada Shipping Act			v	v	
Aboriginal Law, Including Rights and Title					v
Treaties, Conventions and Agreements					
UN Convention on Biological Diversity (and Canadian Biodiversity Strategy)	v	v	v	v	v
UN (FAO) Code of Conduct for Responsible Fisheries (and proposed Canadian Code of Conduct for Responsible Fisheries)					v
UN FAO International Plan of Action for the Management of Fishing Capacity (IPOA-CAPACITY)					v
United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFA)	v				v
Pacific Salmon Treaty	v		v		v
Agreement on Environmental Cooperation (NAFTA)	v	v	v	v	
Policy and Legislation on cross-cutting themes					
Sustainable Development Policy (Auditor-General Act)	v	v	v	v	v
Precautionary principle and approach	v	v	v	v	v

3.7.2 Conservation Direction from the Mandate

Key conservation provisions from the above laws, policies, treaties and agreements are summarized below in connection with the three objects of conservation. The emphasis is on statements that provide direction for the execution of the conservation mandate, from high-level goal statements, to planning objectives.

3.7.3 Direction for Species Conservation

Conservation of Species including Fish

Species at Risk Act: The goal of the Act is to prevent endangered or threatened wildlife from becoming extinct or lost from the wild, and to help in the recovery of these species. It is also intended to manage species of special concern and to prevent them from becoming endangered or threatened.

UN Convention on Biological Diversity (CBD): Establishes three main goals for the conservation of biological diversity

Canadian Biodiversity Strategy: Goals include:

- Maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources.
- Enhance efforts to conserve aquatic biodiversity by protecting: species and ecosystems at risk, endemic species, vulnerable spawning areas and unique and representative ecosystems.
- Reduce to acceptable levels, or eliminate, adverse impacts of species introductions on aquatic biodiversity resulting from aquaculture projects, fisheries enhancement programs and interbasin transfers of water and organisms
- Enhance communication with those who possess traditional knowledge to improve information sharing, and to promote the conservation of aquatic biodiversity and the sustainable use of aquatic biological resources.

Conservation of Fish/fish stocks

New Direction for Canada's Pacific Salmon Fisheries (New Direction) Goal 1: Conservation of Pacific salmon stocks is the primary objective and will take precedence in managing the resource.

United Nations Fisheries Agreement: Provides for the obligation to use the precautionary approach and the ecosystem approach when managing fisheries on the high seas. It obligates States to minimize pollution, waste and discards of fish.

3.7.4 Direction for Habitat/Ecosystem Conservation

Freshwater and Marine Habitat/Ecosystems

Fisheries Act: Core goals include protection against habitat alteration and destruction and provisions dealing with deposits of deleterious substances.

DFO's Policy for the Management of Fish Habitat (originally 1986, updated 2001) flows from the Fisheries Act. It establishes the No Net Loss Policy, which states that "a net gain of habitat for Canada's fisheries resources" is an explicit objective of government policy, and that

> "the Department will strive to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss may be prevented."

Species at Risk Act: A portion of the funding to implement the federal strategy has been allocated to create the Habitat Stewardship Program for Species at Risk. Its goals and objectives are to protect habitat and contribute to the recovery of species at risk. One of its three main focus areas is to secure or protect important habitat to protect species at risk and support their recovery.

Shipping Act: Regulations can be used to protect habitat from interference by boats and boaters. Part 8 contains provisions on pollution prevention, which are the responsibility of DFO. Regulations also limit discharge of ship sewage in several bays and lakes in B.C. that are particularly sensitive to pollution.

New Direction Policy Goal 3: Continue to work toward a net gain in productive capacity for salmon habitat in British Columbia.

Canada-B.C. Fish Habitat Management Agreement (2000): Provides for improved coordination between the two levels of government on projects designed to improve fish habitat protection in the province.

Canadian Biodiversity Strategy (CBS): An "element" is to use objective criteria to select sites for restoration and rehabilitation, and restore or rehabilitate degraded aquatic ecosystems where practical. Two CBS goals are:

- Enhance efforts to conserve aquatic biodiversity by protecting: species and ecosystems at risk, endemic species, vulnerable spawning areas and unique and representative ecosystems.
- Establish reserves to conserve aquatic biodiversity and contribute to networks of national and international protected areas in accordance with the strategic directions provided in the section on protected areas of this Strategy.

Marine Habitat/Ecosystem

Oceans Act objective: To promote an ecosystem-based approach to integrated ecosystem management. The Minister, in collaboration with the provincial government, must develop and implement plans for the "integrated management of all activities or measures in or affecting estuaries, coastal waters and marine waters..."

Oceans Act: Marine Protected Areas (MPAs): A fundamental component of the MPA Vision will be the creation of a system of marine protected areas on the Pacific coast of Canada. This system will provide for a healthy and productive marine environment while embracing recreational values and areas of rich cultural heritage.

3.7.5 Direction for Fisheries Conservation

Fisheries Act: Under the Fisheries Act, it is the Minister's duty to manage, conserve and develop the fishery on behalf of Canadians. The Act provides the legislative authority for

management and regulation of fresh and salt water fisheries, including access, control over the conditions of harvest, regulation of the right to fish, and licensing.

Each DFO-approved fishery management plan under the Fisheries Act is to include a section on goals and performance measures.

Oceans Act objective: Under the Oceans Act, the Minister, in collaboration with the provincial government, must develop and implement plans for the "integrated management of all activities or measures in or affecting estuaries, coastal waters and marine waters..."

New Direction Policy Goals:
2. A precautionary approach to fisheries management will continue to be adopted.
5. The long-term productivity of the resource will not be compromised because of short-term factors or considerations – trade-offs between current harvest benefits and long-term stock well-being will be resolved in favor of the long term.
6. All sectors – First Nations, recreational and commercial – will use selective methods to harvest salmon.

The Aboriginal Fisheries Strategy seeks to provide for the effective management and regulation of the Aboriginal fisheries and ensure that the Aboriginal right to fish is respected, through negotiation of mutually acceptable, and time-limited Fisheries Agreements between DFO and Aboriginal groups.

CBD: The Convention establishes three main goals: (2 and 3 are): the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits from the use of genetic resources.

CBS goal: Support the development of international agreements to encourage the development of biological reference points in fisheries management that provide a basis for the conservation and sustainable use of harvested species.

UN Code of Conduct for Responsible Fisheries goals:

- establish principles, in accordance with the relevant rules of international law, for responsible fishing and fisheries activities, taking into account all their relevant biological, technological, economic, social, environmental and commercial aspects;
- establish principles and criteria for the elaboration and implementation of national policies for responsible conservation of fisheries resources and fisheries management and development.

Canadian Code of Conduct for Responsible Fisheries (proposed): Part II will outline the guidelines for fishers for the protection of the resource and environment, fishing gear, vessels, access and enforcement, cooperation/partnerships, education and research, and public awareness.

UNFA goal: provides for the obligation to use the precautionary approach and the ecosystem approach when managing fisheries on the high seas. It obligates States to minimize pollution, waste and discards of fish. It reiterates obligations of States to control the fishing activities of their vessels on the high seas.

Pacific Salmon Treaty: creates an international Pacific Salmon Commission (PSC) that is responsible for ensuring that salmon are conserved to "achieve optimum production," and for allocating the amount of fish to be taken between the two countries.

3.7.6 The Strength and Breadth of the Conservation Mandate

The conservation mandate of DFO in the Pacific Region is strong. It includes numerous binding responsibilities and obligations related to conservation of species, habitat and fisheries. The bedrock is provided by the Constitution and the BC Terms of Union 1871, which provide the basis for the Fisheries Act.

The conservation mandate to DFO in the Pacific Region is also broad. The coverage of the Fisheries Act is a case in point. It applies to all fish habitat and water bodies that are relevant to commercial, sport or aboriginal fisheries in Canada, and it applies to all lands – public, private or aboriginal. Yet it is not unlimited. For example, only fish habitat that is directly or indirectly relevant to a fishery is protected by law: for the habitat to be protected, the fish that live in it must contribute to a fishery.

The DFO mandate is diverse as well as broad and strong. This diversity has the potential to weaken the mandate, especially if high-level policy direction is included as a component of the mandate. DFO is guided by diffuse direction from multiple sources. The Department's obligations range from the conservation of biodiversity to the sustained production of fish for fishing and ensuring respect for the Aboriginal right to fish.

Over-arching principles increasingly reflected in various sources of the mandate have the potential to reconcile priorities that might otherwise be divergent. These principles include sustainability, ecosystem-based management, and the precautionary approach. The relatively new Oceans Act, for example, emphasizes the principles of sustainable development and integrated resource management. No legislation, however, actually directs DFO to apply or implement these principles in specific ways. In those instances where attempts have been made to define or clarify the application of principles, such as the precautionary principle, the definitions have sometimes been less than helpful to the cause of conservation.

Ministerial discretion in applying the various components of the mandate also weakens its strength. While ecosystem-oriented management is enabled by the Oceans Act, impacts on conservation may be limited by broad discretionary powers. The Species at Risk Act, in contrast, is directive with respect to DFO's role in preventing harm to individuals in a listed aquatic species or harm to their habitat. However, the conservation mandate in the case of SARA is more limited by its potentially narrow application in terms of the requirement for discretion in listing of species and the requirement that economic considerations be taken into account.

Conservation priorities are perhaps most clearly expressed in policies, which include No Net Loss, New Direction for Canada's Pacific Salmon Fisheries, the draft Wild Salmon Policy and sustainable development policy as expressed in connection with the Auditor-General Act. International treaties and agreements are also clear and assertive in their promotion of species, ecosystem and fisheries conservation. Yet adherence to policy can be erratic, and treaties or agreements only become part of DFO's legal conservation mandate if they have been implemented through legislation. The precautionary principle, for example, lacks any method for holding DFO accountable for its application.

Strong, broad, diverse, powerful, discretionary, principled – all these terms describe DFO's conservation mandate. It is the aim of the analysis that follows to determine the extent to which DFO has succeeded in the implementation of this complex mandate.

4 DFO PACIFIC REGION'S CAPACITY TO DELIVER ON ITS CONSERVATION MANDATE

This section provides an overview of the organizational structure and budget of DFO's Pacific Region, and places these in the context of history, current conservation challenges, and paradigm shifts. A picture emerges of increasing organizational complexity accompanied by frequent and disruptive reorganization, shifting socio-political priorities, expanding conservation challenges and shrinking resources. As the workload and the cost of doing the work has increased, the staffing and budget to carry out the work have decreased. These organizational and budgetary considerations have strong implications for performance on the conservation mandate.

4.1 Budget and Organization Levels

The Pacific Region of DFO currently has approximately 2,200 staff, and a budget of over $290 million.

Table 2: DFO Pacific Region Budgets

FUNCTION	Budget ($m.)		2003/4	2001 to 2003
	2001/2	2003/4	% Budget	% Change
SCIENCE	$39.1	$34.5	12%	-12%
OCEANS	$62.0	$27.8	10%	-55%
FISHERIES MANAGEMENT	$36.5	$36.8	13%	1%
ABORIGINAL FISHERIES	$33.9	$28.3	10%	-17%
ENHANCEMENT	$28.2	$23.2	8%	-18%
COAST GUARD	$99.2	$88.5	30%	-11%
EXECUTIVE DIRECTION	$5.5	$3.6	1%	-35%
POLICY	$1.2	$2.1	1%	75%
COMMUNICATIONS	$1.1	$1.2	0%	9%
CORPORATE	$21.3	$45.3	16%	113%
TOTAL	$328.0	$291.3	100%	-11%

Table 1 presents DFO Pacific Region budgets for 2001/2 and 2003/4 by general function or responsibility. It also shows the 2003/4 percentage distribution between functions. The '2001 to 2003 % Change' column shows the percent change in budget allocation between 2001 and 2003. The increase in Corporate budget from 2001 to 2003 was mainly in capital budgets ($17.1m) and operations and maintenance ($5.6m).

These are budgets managed by Pacific Region. They do not include resources administered in Ottawa (e.g. vessel replacement) and do not include funds from other sources, such as the Pacific Salmon Commission, Natural Sciences and Engineering Research Council of Canada (NSERC) and private foundations. It is not clear how revenues are dealt with – whether they are credited against the budget or handled separately. Total projected national DFO revenues from 2004 to 2007 are $96m. These are divided into 'respendable' ($47.2m – all Canadian Coast Guard (CCG)) and 'non-respendable' ($49.2m – from various sources). Total fisheries related revenues (licences, quotas, conservation stamps) are $44m nationally.

In 2003/4, aquaculture is dealt with specifically in Science (Aquaculture Science $5.59m), but not the operational costs (e.g. habitat, CCG, etc). In the National Capital Region (NCR) budget, there is an allocation of $2.74m for Aquaculture Science, but no other specific allocation for aquaculture. In 2001/2, Aquaculture Science budget in Pacific Region was $4.56m; in NCR it was $1.0m. There might also be spending on aquaculture by other federal agencies, as, for example, Western Economic Diversification (see the Salmon Aquaculture case study). In the 2004/5 DFO budget, a total of $21.7m is identified nationally "to manage and research the issues surrounding the development of a responsible aquaculture industry."

The Pacific Region is responsible for implementing DFO's national/general mandates in BC and the Yukon.

Fisheries and habitat conservation in DFO Pacific Region operates within a national policy framework that consists of five basic levels:

1. National level: In most cases, this level provides national direction that applies to all of Canada, such as

- Legislation: Fisheries Act, SARA, Oceans Act;
- Supreme Court of Canada (SCC) decisions;
- Policy direction: e.g., precautionary principle, habitat management policy, Code of Conduct for Responsible Fisheries;
- Financial allocations and controls;
- Departmental changes in responsibility: e.g., CCG to DFO; NWPA to DOT; and
- International agreements: e.g., NAFTA, IJC, LOS.

It also has some unique Pacific Region responsibilities, which include

- Activities, such as stock assessment, associated with the Pacific Salmon Treaty;
- Fisheries management agreements dealing with west coast stocks; and
- PFRCC.

The Region also operates through a series of federal/provincial agreements and Memoranda of Understanding (MOUs), which outline specific responsibilities of federal and provincial governments on certain issues.

The Pacific Council of Fisheries and Aquaculture Ministers has been recently established to attempt to bring more precise Pacific Region focus to DFO's activities.

2. Pacific Region[1]/Provincial level: This is direction that applies only to the Pacific Region, including:

- Pacific Fisheries Regulations;
- Pacific fisheries treaties: salmon, halibut, fur seals, tuna;
- Policy direction: wild salmon policy, catch allocation policy;
- Canada-BC and Canada-Yukon agreements;
- B.C. court decisions; and

[1] Pacific Ocean fish stocks are discrete from and don't significantly intermingle with fish in Arctic and Atlantic oceans, so are managed separately.

- Inter-management area harvesting[2] or conservation issues: stock interception, stock enhancement and habitat protection guidelines.

The Region is organized geographically, by species and by function. The functional structure combines activity areas (Science, Fisheries Management, Habitat), species-specific groupings (e.g., salmon, groundfish), gear types and fishery types.

The activities and direction within Pacific Region operate at four distinct but inter-related, nested geographic levels, the largest being region-wide, then moving to progressively smaller areas of responsibility – Management Area, Watershed Area and Local Area. Direction and responsibilities of each of these is outlined in the following paragraphs.

3. Management Area Level: Management Area direction applies only to a specific area (e.g. North, Central and South Coast, Lower Fraser, BC Interior and Yukon areas) of the Pacific Region, and includes:

- Agreed plans from area advisory or co-management processes (e.g. North and Central Coast advisory groups, WCVI Aquatic Management Board);
- Programs or fishing plans that affect more than one local area, such as restrictions to limit interception of migratory stocks;
- Area-specific habitat management standards;
- Program-specific agreements;
- Federal/Provincial government area management decisions, operational policy direction; LRMPs;
- Catch allocation between commercial gear groups;
- Co-management agreements and processes, such as the salmon Area Harvesting Committees; and
- Inter-watershed issues

There are six area offices, each headed by an Area Director, which report to the Regional Director-General. All but Yukon/Transboundary operate through multiple field offices (a total of 36). They have responsibility for operation and management of hatcheries (15 in total). The distribution of field offices and major hatcheries within the area offices is as follows:

- BC Interior – 9 field offices, one hatchery
- Central Coast – 4 field offices, 2 hatcheries
- Lower Fraser – 5 field offices, 5 hatcheries
- North Coast – 6 field offices, one hatchery
- South Coast – 12 field offices, 6 hatcheries
- Yukon/Transboundary

4. Watershed – District Area Level: This level of direction is watershed specific, such as

- Agreed plans for the management of a local fishery (Nass, Skeena, Barkley Sound – Somass)
- Local agreements on habitat protection
- Regional District bylaws and agreements

[2] Because highly migratory species, such as salmon, are fished in a number of areas along the coast, these fisheries must be coordinated at the Management and Pacific Area levels to prevent inadvertent over-harvest, especially in "mixed stock fisheries". Also, enhancement and other activities that may affect fish production rates must be managed for at this level to prevent unplanned changes in by-catch and interceptions, and to avoid misleading catch and stock information.

- Some First Nations treaties, AFS agreements, bylaws
- Co-management agreements and processes: e.g. Skeena Management Committee
- Issues between local areas

5. Local Area – Subdistrict Level: This level of direction is local area specific, such as

- Some First Nations Treaties or AIPs, AFS agreements, bylaws
- Protected areas management
- Municipal bylaws and agreements
- Agreements on specific industrial developments
- Local fishing plans for non-migratory stocks
- Local public involvement activities

4.2 Areas of Responsibility

The following paragraphs describe the activities of the functional Branches within the regional structure. Commentary is also provided where relevant on the scope and challenges of the various areas of responsibility.

Science Branch (approx. $34.5 million or 12% of the Region's budget)

There are two science and research units in the Region: the Institute of Ocean Sciences (IOS) and the Pacific Biological Station (PBS). Each of these units has responsibilities for some other functions, in addition to its Science Branch responsibilities: IOS has responsibility for some Coast Guard operations; PBS has responsibility for some fisheries management operations. Additional research facilities within this branch include the Cultus Lake Salmon Research Facility and the West Vancouver Laboratory. Stock assessment is handled within Science Branch. Personnel with stock assessment responsibilities are located in four of the six area offices – North Coast, Lower Fraser, South Coast and Yukon/Transboundary.

Although there have been reports that this Branch lost 40% of its funding between 1998 and 2004, the available DFO core budget information doesn't support this. However, DFO provided incentives for high salary senior scientists to retire and then replaced those scientists with lower paid junior scientists. Furthermore, it is apparent that specific Science programs have taken budget cuts of roughly that magnitude, and most special, short-term budget allocations have terminated or "sunsetted," at a time when the Branch workload was becoming steadily larger and more complex. In a letter to PFRCC explaining budget reductions in the science and assessment area for 2003 and subsequent years, the then-RDG noted that reasons for reductions included "regional and national budget adjustments and the completion of sunset programs" (citing CFAR, HRSEP, FsRBC and FRBC).

Oceans (approx. $27.8 million or 10% of the Region's budget)

These activities are dealt with through the Oceans, Habitat and Enhancement Branch. This combining of oceans, habitat and enhancement functions seems to reflect the consolidation of these functions that was recently effected at the national level. However, at the Area Office level, the responsibilities are dealt with separately, as described below. Before consolidation (2004 budget figures), spending on these functions was approximately: Oceans – $1.7 million, or 0.6%;

Habitat – $22.1 million, or 7.6%; Salmonid Enhancement Program – $23.2 million or 8% and Environmental Science – $4.0 million or 1.4%. In Table 1, Enhancement is listed separately from Oceans.

These activities, sometimes differently described, appear to be found in all six area offices. Habitat and Enforcement Branch (HEB) staff are located in BC Interior, Lower Fraser, North Coast and Yukon/Transboundary area offices. Habitat and Community Stewardship and Habitat Management personnel are found in the South Coast area office, and "Conservation Management" personnel in the Central Coast area office.

Oceans Act Responsibilities (approx. $1.7 million or 0.6 % of the Region's budget)

Oceans Act-related activities are undertaken in six areas of the BC coast. The Pacific North Coast Integrated Management Area (PNCIMA) has been designated the first of six Large Ocean Management Areas, and is reportedly to be the subject of a pilot Integrated Management planning process.

Enhancement (approx. $23.2 million or 8% of the Region's budget)

Enhancement deals with the building, operation, maintenance, and evaluation of a broad array of various types of salmonid enhancement projects throughout the region. Until recently, enhancement was part of the Habitat and Enhancement Branch. That branch has now been combined with Oceans responsibilities.

Enhancement activities have been significantly cut back recently, resulting in closure of some facilities and termination of many lake enrichment, public involvement and monitoring programs. Recent developments in the enhancement program are described in greater detail in the salmonid enhancement case study (Section 5.3.10).

Habitat (approx. $26.15 million or 9 % of the Region's budget)

In the Oceans Sector budget for 2003, $21.85 million was allocated to habitat management, $0.25 million to CEAA-related expenditures, and $4.5 million to Environmental Science. While the budget item bears the title "habitat management," it is believed that a significant portion is allocated to enhancement activities. The consolidation of budget categories makes it impossible for us to allocate amounts between the two areas. We estimate that operational habitat work may receive only about 25% of this sector's allocation.

Aquaculture (approx. $5.59 million or 2 % of the Region's budget (research only))

We have only been able to account directly for $5.59 million budgeted for Aquaculture Research in 2003. We have not been able to determine funding levels for other aquaculture-related expenditures in such areas as habitat management and NWPA enforcement. Also, as noted above, in section 4.1, significant aquaculture-related funding takes place at the national level of DFO.

The addition of aquaculture to the Pacific Region's responsibilities has had a double impact on workload. It has used staff and resources to encourage and facilitate aquaculture development. It has increased the conservation monitoring and enforcement workloads. An added difficulty has resulted from the fact that expansion of salmon farming has been regarded as a clear political priority, with the result that conservation staff have been placed in conflict situations regarding

enforcing the law against salmon farms and farmers. Aquaculture related expenditures take place mainly in Science, Oceans, Habitat and Enhancement Branches, but other functions are also involved.

Fisheries Management Responsibilities (approx. $36.8 million or 13% of the Region's budget)

The Fisheries Management Branch is organized according to a combination of geography, species, type of fishing activity and gear type. A Regional Director heads the branch. Area Directors from each of the six area offices report to the Regional Director-General.

Operations are also organized by species. Responsibilities for groundfish are further sub-divided by gear type and species – encompassing trawl fishery, hook and line fishery, halibut and sablefish. Responsibility for the herring fishery is divided between North Coast and South Coast. Salmon management responsibility is divided between the Area offices. Responsibility for shellfish is divided between numerically designated areas – Areas 1-6, 7-13 and 27, 14-26, and 28-29.

Responsibility for recreational fishery management is divided between three designated areas: Coastal BC South, Coastal BC North, and Fraser River.

Fisheries management responsibilities have expanded dramatically in recent years. The expansion includes the establishment of limited entry and quota fisheries, development of increasingly complex and sophisticated management plans, and implementation of a wide variety of techniques that have the goal of achieving improved conservation results. These programs and techniques are described below.

Limited Entry Fisheries

Starting in 1969 with salmon fisheries, the number of licences allowed to participate in various fisheries has been limited. Since that time, other fisheries have each been made limited entry (except for Schedule II fisheries). This theoretically limits the fishing effort for conservation, but its primary effect has been economic. With competitive fishing, the licensed fishermen have strong incentives to invest to increase their catching power to compete for a bigger share of catch. This causes increased conservation risks, major economic costs, and increased management and administrative complexity. To address this pressure, catch quotas have been introduced for many fisheries.

Management Plans

DFO now produces Integrated Harvest Management Plans for each major fishery. They lay out the issues and general direction to be taken and identify basic performance measures. Management plans help organize available information, programs and directions and thereby help to reduce management complexity. However, many of the performance measures are of questionable value because the measures and schedule are not quantified. Also, although the plans are available on the DFO website, the only accountability for implementing the plans is to licence or quota holders, not to the public. As well, the plans are fishery specific and don't address all relevant ecosystem concerns associated with a fishery.

Selective Fishing

DFO has introduced selective fishing requirements for salmon and other fisheries. This is a step forward, but is apparently not being actively pursued beyond the initial steps. There are no clear targets or implementation schedules.

Fishing Pools

To manage excessive numbers of commercial fishing vessels, fishermen in some fisheries are required to join into fishing pools. Their individual catch shares are combined into a pool share. DFO decides how many vessels can safely fish the stocks in an area. Each pool then provides an appropriate number of fishing vessels. The pool catch is then shared amongst pool members in proportion to the number of shares they hold. Fishing pools have been used effectively in the roe herring fishery for a number of years. They have resulted in a significant reduction in over-total allowable catch (TAC) fisheries. Pools are now proposed for introduction in the salmon fisheries. They help to reduce management complexity and risks.

User-Pay, User-Say (co-management)

In most quota fisheries, resource users pay for enforcement, monitoring and, in some cases, research (e.g. sablefish) and enhancement (e.g. geoduck). This has significantly improved the coverage of monitoring and the information on catch and stocks. This initiative has also transferred management costs to fishermen. Co-management has helped to reduce the polarization and confrontation typical in many fisheries. In so doing, it has helped to reduce the management complexity and risk.

Conservation and Scientific Reserves

In some fisheries, a portion of the potential TAC is set aside for research and as a conservation reserve. These scientific reserves are used for experimental harvesting and population studies. They make possible carefully controlled experiments that help to better understand the stock dynamics and conservation factors. Conservation reserves are areas kept closed to commercial fishing. As knowledge of the stocks and their dynamics increases, the amount of reserve is decreased. For example, the sea cucumber fishery involves commercial fishing, research and conservation reserve areas. Also, it is on a three-year harvesting cycle, which allows time to monitor stock rebuilding and adjust fishing areas. This approach lowers the conservation risks and management complexity.

Catch Allocation

By Ministerial direction, salmon and some other species allocations are divided into specific percent shares of TAC to First Nations, sport and commercial fisheries and further by commercial gear sectors. This is a major complexity factor for fisheries management. Court direction on providing the fishing opportunities to meet aboriginal food, social and ceremonial (FSC) needs means that enough fish must be passed through marine commercial, sport and aboriginal fisheries and a number of river fisheries to meet the needs of each band. In many cases, aboriginal needs are stock-specific and thus require selective harvesting to reduce harvest rates on those stocks to meet aboriginal needs.

Individual Quotas

Another fishery management tool attracting increasing interest is individual quotas. This is related to the approach discussed above under User-pay, User-say. Two recent reports, the McRae-Pearse report entitled Treaties and Transition and the First Nations Panel report, Our

Place at the Table, drew further attention to the application of this option in BC. (McRae and Pearse 2004; First Nations Panel 2004). Case studies in section 5.3 of this report show how individual quotas have worked in the sea cucumber and sablefish fisheries. Because of the currently high profile of this management tool, and controversy about its effectiveness, the authors provide an extended discussion of it in Appendix 8.1, in an effort to clarify some of the complexities associated with its use.

Conservation and Protection (the Enforcement function) (approx. $14.7 million or 5 % of the Region's budget)

The Conservation and Protection (C&P)) directorate, which deals with enforcement activity, is organizationally located within the Fisheries Management Branch. C&P personnel are located in all of the area offices. The approximately 170 fisheries officers may have different titles in different areas of the Region.

In 1995, Ottawa reclassified Fishery Officers into three organizational units: Native Fishery Officers, General Officers and Habitat Officers. The Habitat Officers no longer reported to C&P and, due to internal politics, became non-uniformed habitat technicians rather than doing enforcement work.

The challenges to DFO enforcement personnel have increased in recent years. With faster boats and improved electronics it is easier to fish illegally. With improved transportation it is easier to move illegal catch (e.g. illegally caught clams, abalone, etc.) into the market place. With increasing local human populations, the amount of salmon going to direct sales is increasing (much of it unaccounted for). The burden of proof required for a criminal conviction has increased significantly. Finally, the increased value of catch makes it increasingly worth the risk to fish illegally, especially when DFO vessels are tied up and inoperative because of lack of resources.

DFO reorganizations have affected the DFO Conservation and Protection function in a number of ways, both direct and indirect. They have reduced budgets, but also resulted in a shift of priorities away from fisheries enforcement. For example, the DFO C&P patrol fleet was in either the Fish Ops or Corporate sector until 1996/7, at which time the DFO and Canadian Coast Guard (CCG) fleets were combined and costed under CCG. The combined fleet was then downsized. The first priority for all remaining vessels was to meet CCG safety and Search and Rescue (SAR) responsibilities. The overall result was a major reduction in vessel time dedicated to fisheries enforcement and monitoring. The DFO vessel crews had also done spawner counts and carried out a variety of other support functions for fisheries and habitat management. The change to general service CCG crews reduced that type of work. The amount of reduction is difficult to quantify.

Increasingly, DFO is moving toward the use of administrative law in addition to use of the criminal law. The habitat protection system of agreements with developers is essentially administrative law. McRae and Pearse (2004) have recommended the switch to administrative law and sanctions for fisheries management and conservation., To achieve the promise of a combined administrative/criminal system would require a carefully structured and monitored process, with clear accountability. Criminal law is the foundation of enforcement; administrative and ticketing approaches are best used in support of the criminal law.

Aboriginal Fisheries (approx. $28.3 million or 10% of the Region's budget)

These activities may be found in two area offices – North Coast and Yukon/Transboundary. The responsibilities relate mainly to delivery of the various Aboriginal Fisheries Strategy programs.

DFO Pacific Region's involvement with aboriginal fisheries began with the establishment of a special Native Affairs group in the mid 1980s. In the 1990s, the Sparrow decision and a number of subsequent Supreme Court of Canada (SCC) decisions on Aboriginal rights issues impacted DFO operations. Initial response to these decisions took the form of the Aboriginal Fisheries Strategy (AFS) (1992), which involved negotiating and managing co-management agreements with as many First Nations as were willing to be involved. The budget for this activity increased from about $250K (in 1991) to $2M in 1993 and then to more than $20M in 1998 and $30M in 2001.

In addition to these AFS responsibilities, multiple ongoing treaty negotiations have also drawn experienced staff away from DFO core activities in both BC and the Yukon.

Canadian Coast Guard Operations (approx. $88.5 million or 30% of the Region's budget)

Coast Guard operations may be found in three Area Offices (Central, North and South Coast) and one Science office (IOS). Eight CCG units are based out of the South Coast Area Office.

Executive Direction (approx. $3.6 million or 1% of the Region's budget)

The Regional Director-General's office directs the activities that take place in the six Area Offices and two scientific research facilities as well as Regional headquarters functions.

Policy (approx. $2.1 million or 0.7% of the Region's budget)

The Policy function provides policy, planning, evaluation and executive support to Pacific Region and is based in the Regional headquarters.

Communications (approx. $1.2 million or 0.4% of the Region's budget)

The Communications function coordinates public information, media releases, and educational materials, primarily in support of Regional programs. This is primarily a Regional headquarters function.

Corporate (approx. $45.3 million or 16% of the Region's budget)

The Corporate functions include financial management, human resources, purchasing, asset management, and other support services. This is primarily a Regional headquarters function with some staff decentralized to various other sites.

Changing Responsibilities of Operating Managers

DFO operating managers in all branches must deal with an array of competing responsibilities, interest groups, priorities and goals. For example, fisheries managers are responsible for conserving fish stocks, and for managing ocean and river fisheries with the objective of achieving catch equity for aboriginal, commercial, and recreational fisheries as well as catch equity between First Nations and between commercial gear sectors. Habitat managers are to ensure that there is 'no net loss' of fish productive habitat capacity. They are also expected to

maintain good working relationships with the provincial agencies and industries involved, and with other federal agencies and departments. However, there are not enough resources to measure the baseline habitat capacity, the impacts of most developments, or their conservation risk and costs. Consequently, 'no net loss' and development impacts on habitat productive capacity cannot be quantified in many instances. In contrast, the economic and employment benefits of proposed developments are clearly quantified (but usually over-estimated).

4.3 DFO Resources – Historic Perspective

It has been difficult to assemble an accurate and complete statement on the resources allocated to DFO Pacific Region activities. In part, this is because of difficulties in accessing budget information for enough years to get a perspective on how budgets have changed. DFO is apparently under no obligation to retain budget information beyond seven years. Consequently, older information must be drawn from a multitude of other sources, often in different formats.

In addition to access challenges, the information is complex because of the different forms it comes in and the differing levels of detail within allocations. For example, employment can be reported in person years or employee counts of indeterminate (permanent), term (more than 3 months) and seasonal employees. Salary and related allocations can include one or more of the following: regular time, overtime and government contributions to benefits.

There are a number of different budget reports, including:

- Regional Manager operating budgets, which in the past excluded government pension contributions;
- Main Estimates, which include Government pension contributions;
- Expenditure reporting, which reports money expended;
- Deputy Minister (DM) Allocations;
- Nominal Expenditures; and
- Other reports, prepared for various purposes.

In some cases, the various numbers are the same, similar or at least comparable. In others, they differ significantly without explanation of the differences. So-called 'A' base allocations represent core funding; 'B' base monies are dedicated to specific purposes, such as the HCSP program, which terminated in 2003.

Additionally, some budgets that are spent in the Pacific Region are, or have been, centrally held, such as monies for: Science vessels, DFO vessel replacement, AFS, CCG capital, Green Plan, Air Surveillance, Small Craft Harbours, special programs, and international fisheries. This means that in some years actual Pacific expenditures may have been significantly underestimated. With organization changes, the budget distribution has been altered, making it difficult to track allocations for specific activities. For example, separate SEP and habitat management groups were combined and then later combined with Oceans. That grouping makes it difficult to isolate amounts of funding dedicated to habitat protection work.

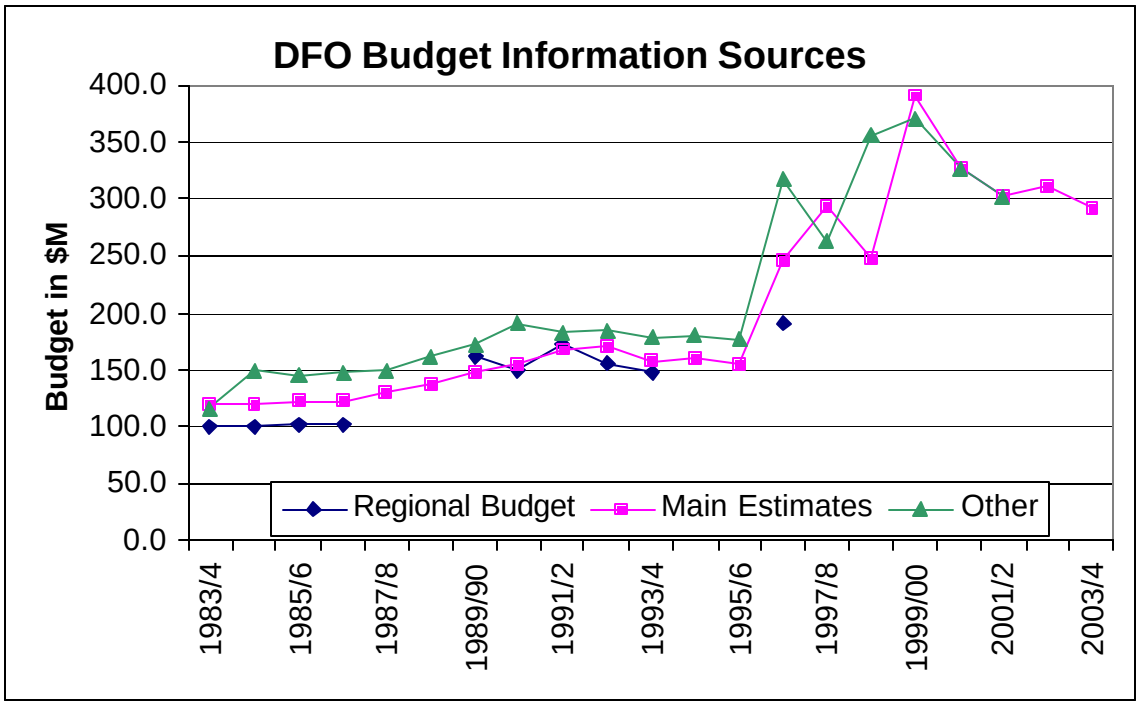
Figure 1 shows the available DFO budget information from 1983/4 to 2003/4. It shows the available Regional budgets, the Main Estimates and 'Other' that includes information from DM allocations, expenditure reports, and various other reports. However, none of these categories captured funds held in Ottawa but spent in the Pacific Region. For some years there are a number of different reported budgets. For example, in 1994/5 there were: Main Estimates at $159.6M;

detailed budget at $189.5M; and a DM allocation of $133.7M and Expenditures report at $179.7M.

From here on in this analysis, for consistency, the Main Estimates are used for the total DFO Pacific expenditures. For 1983/4 to 1987/8, Main Estimates were not available so were projected from Regional Budgets and other sources.

Figure 1: DFO Budget Information Sources

DFO budget information is drawn from a number of sources. Regional budget figures are the numbers local managers use. Main Estimates is the official budget.



Beyond the changes in budget, there have been significant changes in responsibility and workload, for many of which no increased resources were provided. For example, many of the responsibilities associated with the DFO 'New Directions' Program had no new continuing resources, but required significant continuing workload. As another example, the change to science-based management meant that stock assessment workload was increased beyond the capacity of existing staff; shortfalls in assessment resulted.

Figure 2 shows the Pacific Region budget increasing over the period 1983 to 2003. However, the increases are attributable to increased responsibilities, inflation and special expenditures. There were major differences in responsibilities between years.

Figure 2: Major DFO Budget Components that have Changed in the 1983 to 2003 Period.

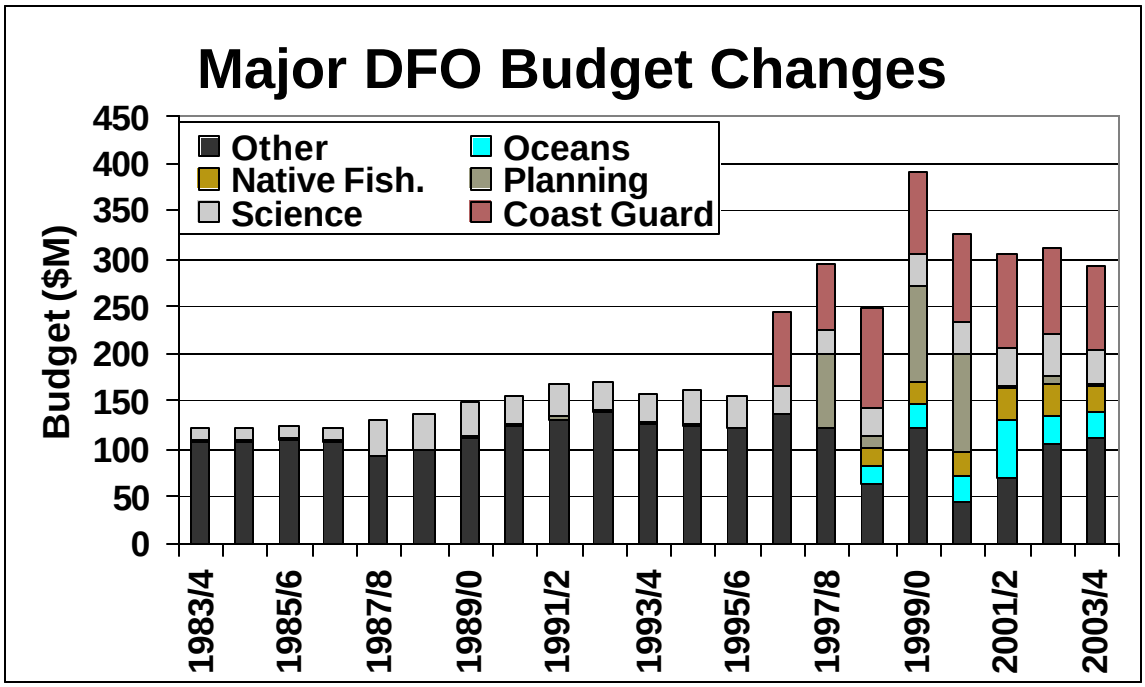


Figure 2 breaks the budget down into some of the major components that have changed over the period.

- In 1987/8 Ocean Sciences (physical and chemical oceanography, hydrography, mapping and the oceanographic fleet) was added to DFO Science (Science in figure) adding about 280 person years (PYs) and $25.4M to the budget.
- In 1992/3 the Green Plan (six year) program came into the Region, with annual resources of about 14 PYs and $5.9M in budget.
- In 1997 Inspection Branch was moved out of DFO, taking 66 PYs and $3.6M.
- In 1996/7, Canadian Coast Guard was added to DFO.
- In 1997/8, $80 to $100 million was provided for the Mifflin Plan licence buyback program (Planning in figure).
- In 1998/9, funding for Aboriginal Fisheries (Native Fish in figure) was increased by $20 million and $17.8 million was provided for Oceans.
- From 1998 to 2002 the Canadian Fisheries Adjustment and Restructuring Program spent about $400M in Pacific Region – about $195M for licence buyback (Planning in figure), about $34M on rebuilding the resource, about $100M on restructuring the fishery and about $71M on the community development and stewardship program.

The balance of the budget, for core fisheries and habitat management and enhancement activity, is shown as 'Other' in the figure. It shows a clear decline. The increases from 1999/00 to 2002 are in part a result of short term funding associated with the Canadian Fisheries Adjustment and

Restructuring Program, including funding for Selective Fishing, Habitat Restoration and Salmon Enhancement, Community Stewardship and Strategic Enhancement.

Figure 3: Major DFO Budget Components in 2004$ to Show the Impacts of Inflation on the Core DFO budget.

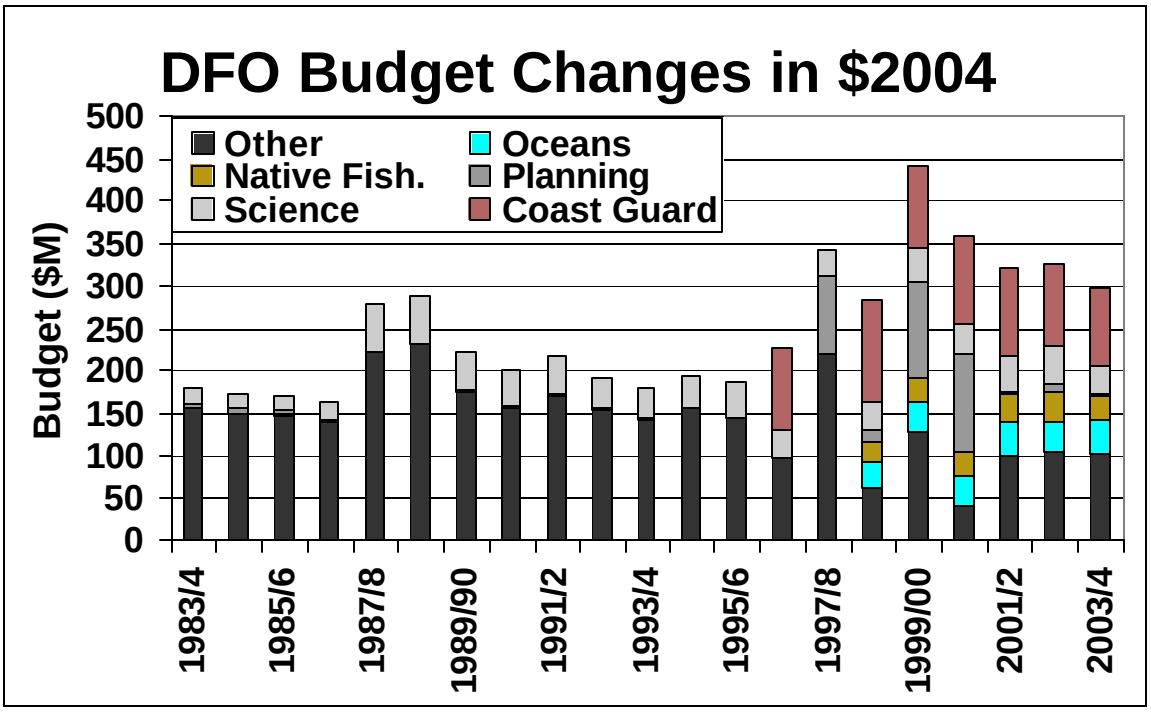


Figure 3 shows the same budget information as that presented in Figure 2, but shows it in 2004 dollars, to adjust for inflation rate. It clearly shows the decrease in buying power of the core budget over the time period.

Figure 4: DFO Sectoral Budgets

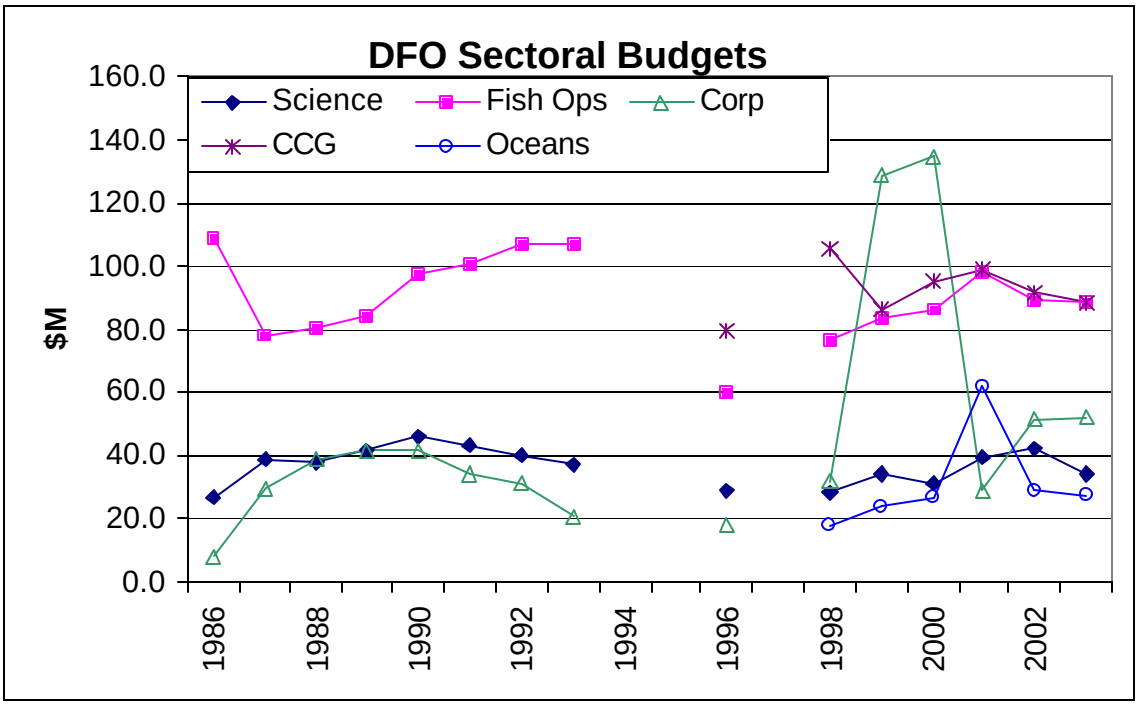


Figure 4 follows the budget of DFO sectors. Through time, the components of each sector have changed, so that completely comparable information is not presented from year to year. For example, as noted above, changes in responsibilities of the DFO C&P patrol fleet have taken place over the years, to the detriment of fisheries enforcement.

Another thing that can be misleading is the change in responsibilities through time. For example, Native fisheries budgets and workload have increased considerably. SEP and habitat protection were combined, with some responsibilities going to Science, others accounted for in Operations. Short-term funding comes and goes: Green Plan from 1993 to 1997; CFAR from 1998 to 2002. This temporary funding gives the impression of budget levels being maintained. However, the special funding is for specific purposes and is not supposed to be used for the core functions that have lost funding. In reality, though, special funding may be directly or indirectly used for some core functions, with the result that its intended purpose is compromised to prevent compromise of core functions.

There have been reductions over time in all of the core fisheries activities. Fisheries management budget was reduced by: $1,584.9K in 1994/5; $214.7K in 1995/6; $311.5K in 1996/7; and $312K in 1997/8. Conservation and Protection was reduced even more; $945.3K in 1994/5; $1,496.6K in 1996/7; and $1,690.5K in 1997/8. The total reduction over the four years was more than $6.5 million.

To determine more precisely the relationship between budget and conservation, we must examine two components: budget available and workload. For Science, the budget decreased from about $40 million in the 1986-94 period to about $35 million in 1996-2003. Adjusting for inflation in 2003 dollars would show an even greater decrease. User-pay has supplemented

budgets but likely doesn't show in DFO budgets. In the 1986-2003 period the science workload increased significantly as a result of the change to scientific management, emerging climate related problems in the ocean and freshwater, stocks at risk, and user-pay research. Overall funding/workload has decreased significantly. The situation may improve slightly as the highest paid senior scientists retire and are replaced by younger scientists.

For Fisheries Operations, somewhat the same trends and considerations apply as in the case of Science: budget decrease in both current and 2003$; increasing workload with new programs such as selective fishing, Native fisheries and habitat protection. User-pay with third party monitoring and analysis has increased total work done, but not at a cost to DFO. Also, Fisheries Operations ships were budgeted within Fisheries Operations or Corporate and are now in CCG, so the graph representation is not complete. There is increased reliance on fisheries and developers to adopt self enforced compliance.

Oceans funding appears to be increasing, but primarily because of the redesignation of Habitat and Oceans under one division. Corporate spending has increased, but to some degree because CCG corporate spending was added to the total. In summary, then, although total funding has increased over the last 18 years, the responsibilities and workload have increased disproportionately. Expansion of workload is outpacing expansion of budgets.

By 1999, the SEP budget decreased by $10.87 million, down from $38 million in 1990. That is a 28.6% reduction, not allowing for inflation. This underestimates the actual reductions, because repair and replacement of capital equipment has been deferred, creating a significant liability for the future.

The proportion of the overall budget committed to salaries has also increased. This means that there is less money per staff member to do field work to understand and address problems and to do field enforcement. As well, the cost of doing fieldwork has increased. From the available information it appears that Science budgets decreased by 26.5% in the 1990s. The dollars per PY in the region decreased by 30%, even with decreasing number of staff.

4.4 System Shocks

DFO Pacific Region's management, operations and performance have been affected, over the years, by a number of external and internal shocks. The external shocks are of long standing, the internal shocks more recent – taking place during the past 10-15 years. We outline that history in this section, in the following text and related timeline table.

External Shocks

Fish stocks, their habitat and ecosystems have been subject to a continuing series of major and minor shocks from the start of industrial development in British Columbia. From at least the 1880s on, a primary government goal has been economic and rural development. The government encouraged immigration to and resource use in rural areas. The development history includes large scale habitat impacts, such as: the Hells Gate slide triggered by construction of a railroad; dams built to generate electricity that blocked all salmon migration; hydraulic mining for gold that destroyed major spawning and rearing areas; extreme logging practices such as splash dams that obstructed migration and destroyed habitat; industrial practices that resulted in

degraded water quality in waterways; and issuance of water licences for more than the water available in many areas.

Industrial fisheries were generally managed for economics and private investment, and, only as the needs became apparent, to conserve valuable stocks. Ecosystem impacts included early depletion of whale, fur seal and sea otter populations, later fishing out of the herring resource, and fishing down of many other populations. Major changes in the fisheries occurred after World War II with the widespread application of new or improved technologies including nylon nets, radios, radar, sounders, fiberglass or aluminum hulls, purse seine power blocks and drums, and new troll gear. Government programs also had major adverse impacts on fisheries conservation. For example, the goal of the Davis Plan, from 1969 to 1973, was to create a modern industrial fleet. It encouraged upgrading of the fleet and pyramiding of gillnet and troll licences into purse seine licences and larger combination gillnet and troll vessels, to increase the catching power and the efficiency of the fleet.

The conservation impacts of such uncontrolled industrial development gradually became apparent. Over time, these practices were changed and their impacts on fish and their ecosystems moderated. We are still trying to limit and reduce habitat and fisheries conservation impacts and to undo past mistakes, rehabilitate damaged habitat and rebuild depressed stocks. These actions are often impeded by bureaucratic and legal processes, many with long roots to the past industrial development era. Some of the system shocks over the past 10-15 years are summarized in the following tables.

Internal Shocks

In analyzing budget and staffing trends for DFO Pacific Region, it must be kept in mind that the organization is not a static entity. It has been subject to a number of what might be called "system shocks" over the past 10-15 years. Some of the most important of these are listed in Table 3. Some have been self-inflicted – as, the extensive internal reorganizations of the mid- to late-1990s. Others have resulted from new, changed or relocated programs created by Parliament and the government of the day. Still others represent one-time "bursts" of funding (for example, CFAR) that, while perhaps well intentioned, have often turned out to be disruptive. So, while trends in funding levels can be identified – and they are usually downward – it must be remembered that funding levels apply to an ever-changing program mix. These changes in programs often expand, change, complicate and confuse the agency's mandates.

Other insidious shocks have been related to the continuing shrinkage of office and storage space that has necessitated disposal of old records. Every office move has resulted in disposal of more past records, rather than the filing of them in the federal archives. Also, converting from paper to digital records has resulted in high grading of past records and elimination of much important detail.

Table 3: The Effect of Expanded and Changed Responsibilities and External Events on DFO Pacific Region's Management and Operations

Year(s)	Action/Activity	Comment
1990	Vision 2000	Regional discussion document
1991-97	Federal Green Plan	Approx. $80 million in funding to the Region, to be spent over six years. Included BC programs such as the Fraser River Green Plan
Early 1990s	Federal Cost Reductions (various)	Started DFO budget, staff cuts; shifting of programs between departments
1992	Aboriginal Fishing Strategy	In response to the 1990 Sparrow decision; the first of many court decisions relating to First Nations' rights
Mid-1990s	Precautionary Principle	Not yet effectively implemented in practice
1994	Fraser Report on "Missing Sockeye"	Brings fisheries issues into the public consciousness
1995	Decreased ocean productivity	Survival of many species dropped; fishery closures/reductions; selective harvesting
1995	Canadian Environmental Assessment Act	Added significant project review responsibilities
1995	Code of Conduct for Responsible Fisheries	Only partially implemented as of 2004
1995	Federal Aquaculture Development Strategy	Responsibilities added; expanded responsibilities since 2002, following lifting of provincial moratorium
1995-96	Habitat Enhancement Branch	Amalgamates SEP, Habitat Management and Fraser River Action Plan
1996	Intersectoral salmon allocation	May report followed by implementation of policy re First Nation, sport, & commercial sectors
1996	Canadian Biodiversity Strategy	Not acted on until 2005
1996	Mifflin Salmon License Buyback Plan	$80-100 million spent in 1997-98
1996-97	Canadian Coast Guard	Moved from Transport Canada to DFO, with major budget impact (now 35% of Region budget)
		Integrated CCG/DFO fleet downsized
1997	Oceans Act	Memorandum of Agreement with B.C. executed in 2004
1997	Canadian Fisheries Adjustment and Restructuring Plan (CFAR)	$400 million in funding 1997-2002, for salmon licence buyback ($195M), habitat and enhancement activity ($34M) rebuilding the resource, ($100M) restructuring the fishery, ($71M) community development and stewardship
1998	Minister Anderson reaffirms habitat policy [no net loss/ net gain] (as part of CFAR)	
1998	Navigable Waters Protection Act	Moved to DFO, from Transport Canada
Mid-1990s	Expanding fisheries management responsibilities	
1998	New Direction for Canada's Pacific Salmon Fisheries	Made conservation the primary objective; adopted precautionary and ecological approaches to management

Year(s)	Action/Activity	Comment
1998	Pacific Salmon Treaty revisions in effect	
1999	PSARC Restructuring	To add habitat analysis
1999	Selective Harvesting Policy	To facilitate conservation of stocks
2000	Wild Salmon Policy	Drafts in preparation, 2000 to the present
Late 1990s	Extensive internal reorganization	Reassigned many staff to completely different responsibilities
2001	Change in BC provincial government	Dramatically increased pro-development, industry self-regulation emphasis, provincial enforcement cutbacks
2002	Species at Risk Act	Mandatory provisions contrast with discretionary provisions of the Fisheries Act
2002	Fraser River Panel	Addressing major late run sockeye conservation problems
2003	Aquaculture expansion to other species	Sablefish culture development
2004	McRae-Pearse and First Nations Panel reports	Propose significant changes in fisheries management approach
1990-2004	External shocks, various	Including surprise decreases in ocean survival, rapidly increasing demand for new species (esp. from Asia), collapse of salmon prices worldwide.
2004	Navigable Waters Protection Act	To be moved out from DFO, returned to Transport Canada
2005	2004 Southern Salmon Fishery Post-Season Review	Panel headed by Judge Bryan Williams

4.5 Paradigm Shifts

In addition to the changing and expanding program mandates, there has been a slowly developing, uneven paradigm shift – a change in the way the public perceives the world – which affects DFO management and operations in both direct and subtle ways. The department now exists in a "transition time," a time at which the old ways of doing business co-exist with the new and emerging ways – not always smoothly or peacefully.

Table 4 provides a summary description of the main aspects of these changes in public values and perceptions.

Table 4: Paradigm Shifts Relevant to DFO Pacific Region's Management and Operations

PAST AND PRESENT	PRESENT AND FUTURE
Extraction of the Resource	**Sustainable Management** [New Directions, WSP, selective fishing]
Reactive Management [problem to problem, cut funding to things going well]	**Proactive** Management [Quotas require a long term anticipatory approach]
Government Ownership of the Resource, its problems and costs [consult, but final decision by government]	**Public Ownership** of the Resource, its problems and costs [quota holders input to decisions]
Common Property Management - competition for fish - government pays - input oriented and controlled	**Quasi-Property** Rights - competition for markets - user pay for many services - output/results oriented
Adversarial Management Approach	**Cooperative** Management [in commercial, sport and Indian fisheries]
Specialization/**Segregation: Focus on Parts**, Species, Organizational Functions, Gear types [e.g. McRae-Pearse]	**Integration**, Interdependence: **Focus on Ecosystems** [e.g. First Nations Panel on Fisheries, New Directions}
Accountable to **Parliament** (for budget)	Accountability to **Public** (for the resource)
Secrecy: Limited Information on Issues That Affect Public	**Openness**, Full Public Information [Web improved access]

From Extraction and Use to Sustaining Resources

Until fairly recently, the primary emphasis of fisheries management was on finding more efficient ways of *extracting and using* resources. Now greater attention is paid to *sustaining* resources, balancing their current use with assurance of availability for future generations.

Programs such as the Species at Risk Act, the draft Wild Salmon Policy, and selective fishing strategies reflect this sustainable management orientation. In the enhancement area, emphasis is shifting from enhancement for production, to enhancement for conservation and in aid of habitat restoration and species recovery. The Oceans Act can be regarded as a program that simultaneously favours both resource extraction and conservation, leaving it to implementing agencies like DFO to strike the appropriate balance.

Summary: the shift to sustaining resources has been slow to occur. Newer sustainability-oriented programs are still in the planning stage; funding shortages may prevent their implementation.

From Reactive to Proactive

There is a gradual shift from *reactive* management, dealing with problems as they arise or after they have arisen – damage control – to *proactive* management, with longer planning horizons and greater efforts to anticipate future problems and to deal with them in early stages, rather than after the damage has been done. Integrated Harvest Management Plans provide an example of this shift.

Summary: DFO remains primarily in reactive mode, with funding shortages limiting the ability to management proactively in many areas.

From Government to Public and Quasi-Property Rights

Traditionally, *government ownership* of the resource, and *government responsibility* for its problems and costs, was assumed. Now the resource is coming to be viewed as *publicly owned*, with the existence of *quasi-property rights* and responsibility for payment for and provision of services assumed to be shared between government and users. The definition of the extent of quasi-property rights is a subject of ongoing debate, reflecting the unsettled state of this part of the paradigm shift. The debate is to some degree a philosophical one, but is also influenced by federal budgetary considerations that require non-government entities to bear some of the costs of effective management of fisheries resources. For instance, McRae-Pearse (2004) recommended quotas for all the remaining commercial non-quota fisheries, including salmon. They also recommended quotas for sport and Native fisheries.

Summary: Financial limitations and philosophical disagreements make this an unsettled and confused area, with no clear or uniform direction.

From Simple to Complex Accountability

There has been a shift from relatively *simple and straightforward accountability* to Parliament – for budget expenditures – to a *more complex accountability* to the public and to a variety of stakeholder groups for many aspects of the use of the resource.

Expanded DFO consultation activity is one manifestation of this expansion of accountability. Another is the gradual shift from an *adversarial* management approach to a more *cooperative* one, seeking to balance multiple interests of stakeholder groups involved with the fishery. This doesn't always work. To date, for habitat protection it has resulted in continual loss of capacity.

Summary: Neither simple nor complex accountability are being effectively achieved at the present time, in spite of Departmental statements acknowledging the importance of both.

From Secrecy to Openness

In a related shift, the department has had to move from *secrecy* – limited communications with relatively small numbers of people who have a "need to know" – to greater *openness* and provision of information to a far larger number of interested publics. Technology – most notably Internet – has accelerated this change; institutional resistance and small exclusive user groups and privacy legislation slow it. Openness initially takes more staff time and allows for more public influence. It increases the opportunity for meaningful political intervention.

Summary: While the Department acknowledges the importance of openness, its efforts to achieve it have had mixed results, at best.

From Centralized and Politicized to Decentralized and Open

Authority for departmental operations can now be characterized as *centralized and politicized,* both in Ottawa and at the RDG level. Over time, it is likely to become more *decentralized, with greater stakeholder empowerment,* reflecting the changes in resource ownership, accountability and information flow described in the paragraphs above. At present, increased stakeholder empowerment appears to be stated as a goal, with a mixed record of follow-through toward actually making it happen in practice. For example, some quota fisheries with 'user-pay' are increasingly getting 'user-say'. Decentralized DFO organization may help to improve coordination between DFO and BC on local habitat issues. The recent re-centralization, to Ottawa, of decision-making on major project reviews, suggests that movement is taking place in both directions.

Summary: Decision-making remains centralized, with only slow and uneven movement toward decentralization.

From Specialization to Integration

The department is slowly moving from *specialization and segregation* – a focus on parts, species, organizational functions, gear types – toward *integration and interdependence* and an increased focus on ecosystems. Ecosystem-based management is a relatively new concept, and will require continuing and sustained institutional learning. And even comprehensive ecosystem-based analysis will require data drawn from specialty areas, though the data will increasingly be analyzed with greater emphasis on interactions and cumulative effects. The department's current organizational structure is quite reflective of the specialization orientation, and is likely to shift only slowly to reflect the integrated approach.

Summary: Specialization remains the order of the day; pronouncements about greater integration (e.g., ecosystem approach) have not been effectively implemented.

Net Effect of the Paradigm Shifts

The net result of these changes, which are being implemented at different rates of speed in different parts of the organization, is often confusion and inconsistency or paralysis, inability or unwillingness to take decisive action in either the old or the new direction. Visible but slow progress is being made in fisheries management, less progress and possibly even retrogression in habitat management.

5 PERFORMANCE ON THE CONSERVATION MANDATE

This section examines DFO Pacific Region's performance on the conservation mandate from an overview perspective and from the perspective of twelve case studies. The overview describes previous analyses of DFO's performance on various aspects of its conservation mandate. Based on our review of previous analyses, and on the analysis of DFO Pacific Region's capacity to deliver its conservation mandate in section 4, we generate a set of possible challenges to performance on the conservation mandate, in section 5.2. Section 5.3 then presents a set of case studies that deepen the analysis, specifically exploring ways in which DFO is meeting, or failing to meet, the challenges described in section 5.2. The case studies are also intended to increase public understanding and to illustrate key problems and successes.

5.1 Previous Analyses of DFO's Performance on its Conservation Mandate

Many previous studies have assessed aspects of DFO's performance on its conservation mandate. The literature reviewed for this report analyzed and critiqued DFO's performance in general terms and with reference to specific projects or program activities. In this section, we provide an overview of an array of reports and studies, which we drew upon in this assessment. In some cases, the work of key organizations is described; in others, the literature relevant to a given conservation-related topic is briefly described.

Auditor-General Reports

The Auditor-General has reviewed DFO Pacific Region's performance on conservation-related issues, specifically those related to Pacific salmon and salmon aquaculture, on a number of occasions in the past decade. The most recent Auditor-General's report, which was conducted in conjunction with the office of the BC Auditor-General, was tabled before Parliament on October 26, 2004 (Office of the Auditor-General of Canada 1997, 1999, 2000, 2004). DFO's responses to these reports are presented on the departmental Web page (DFO 2004).

The recently-issued BC Auditor-General's report dealt with many of the same issues, from the provincial perspective (British Columbia. Office of the Auditor-General 2004).

Pacific Fisheries Resource Conservation Council

The annual reports of the Pacific Fisheries Resource Conservation Council (PFRCC), since 1998-99, have identified a variety of shortcomings in DFO's performance in meeting its conservation mandate. The PFRCC Web site also contains an archive of correspondence between the Council, its Chairman and regional and national DFO officials on matters relating to conservation budget expenditures, performance related to stock assessment, hatcheries and enhancement, salmon aquaculture and a variety of other subjects The Council has also issued reports on a number of specific subjects related to DFO's conservation performance, including: salmon aquaculture and its impacts on wild salmon, hatcheries and enhancement and their impacts on wild salmon, issues related to low and altered water flow, and conservation-related impacts of cutbacks in DFO stewardship programs (PFRCC 2004).

House and Senate Committees

House and Senate committees have conducted a series of hearings and investigations on subjects related to DFO's performance on its conservation mandate, and have issued reports with findings and recommendations (House Standing Committee on Fisheries and Oceans 1997, 1998 and 2004; House Standing Committee on Public Accounts 1998; Standing Senate Committee on Fisheries 2001).

Legal Issues

Recent books and articles dealing with Canadian environmental law have commented extensively on the legal basis of DFO's conservation mandate and the Department's performance in meeting conservation mandate objectives (Boyd 2003, Gaertner 2004).

Public Consultation

The Institute for Dispute Resolution at the University of Victoria conducted an independent review of DFO's consultation and public involvement activities in 2000 and 2001. Some of the recommendations of its review have been adopted as part of DFO's expanded consultation programs (Institute for Dispute Resolution 2001).

Habitat Conservation and Preservation

A number of reports were prepared in the late 1990s and early years of the 21st century evaluating DFO Pacific Region's performance in the preservation of freshwater, estuarine and marine habitat. In addition to general assessments and evaluations, the following specific subjects were dealt with:

- assessment of the effectiveness of the referral process for protecting fish habitat;
- audit of forest road crossings of fish-bearing streams;
- assessment of habitat impacts of logging activity; and
- assessment of achievements under the "no net loss" policy.

See section 5.3.12 for a review of the various studies related to habitat conservation.

Fisheries Management

The evolution of fisheries management in the Pacific Region has been documented in a series of descriptive and analytical reports and books, as well as in individual integrated fisheries management plans. In addition to profiling individual fisheries, the reports have evaluated quota management systems and analyzed options for involvement of First Nations in the fisheries of the future (McRae and Pearse 2004; First Nations Panel on Fisheries 2004; Ecotrust Canada 2004; UFAWU-CAW 2004; Jones (with M. Bixby 2003)).

Budget Matters

Two reports, by Glavin and Walters, provided background documentation on DFO Pacific Region budget trends between the mid-1980s and the mid-1990s (Glavin 1986, Walters 1995). For the current research we also reviewed numerous DFO budget and program documents.

Fraser Sockeye

A series of reports – in 1994, 2002 and 2004 – have analyzed the reasons for so-called "missing Fraser River sockeye" during these time periods. They contained analyses of the actions of DFO and others, as well as recommendations for changes to improve future management (Fraser 1994; DFO 2003; Cummins and BC Fisheries Survival Coalition 2004; House Standing Committee on Fisheries and Oceans 2004).

Salmon Aquaculture

Ongoing controversies over salmon aquaculture in recent years have generated a large quantity of pertinent literature. Much of it deals with DFO's performance in meeting its conservation mandate responsibilities vis a vis aquaculture, in particular regarding aquaculture's impacts on wild stocks (Hume et al. 2004; Gardner and Peterson 2003). In addition to the reports dealing with the general subject matter, a number of studies were undertaken on the Broughton Archipelago sea lice situation. These are discussed and referenced in the case study on this subject, in Section 5.3.8.

Hatcheries and Enhancement

In the course of preparing a report for PFRCC on assessment of Pacific Region hatcheries and enhancement programs published in 2004, the authors of this report assembled and reviewed a number of documents assessing various aspects of these subjects – including some of the most current research in the US as well as Canada (Gardner et al. 2004).

Enforcement

Sources of information on enforcement included the 2003 analysis done by Stratos, Inc. of DFO's compliance with federal environmental statutes (DFO Audit and Evaluation Directorate 2004) and DFO databases summarizing enforcement activity for recent years.

Oceans Act and Strategy, Integrated Management and Marine Protected Areas

There is little literature reviewing performance on the Oceans Act and related DFO commitments, probably because this aspect of the conservation mandate is relatively new. The sources of information used include DFO reports, a House of Commons Committee report, various press releases, conference publications and newspaper articles.

5.2 Possible Challenges to Performance on the Conservation Mandate

This section describes eight core challenges suggested by the research that appear to weaken the ability of DFO's Pacific Region to carry out its conservation mandate. Case studies in Section 5.3 explore how the challenges have been expressed in particular issues and illustrate the extent to which DFO appears to be rising to or failing to meet the challenges.

Inadequate Information

Lack or absence of scientific assessment, baseline research, or stock and habitat assessment information appears in a number of settings –in particular, in fisheries management plans, and in

habitat management, enhancement and restoration activity. Mixed stock fisheries complicate the stock assessment process. Stock assessment capability in the Region has been steadily eroded, with monitoring and sampling often limited to a few indicator stocks.

Lack of Transparency and Accountability

This problem also appears in a number of different settings. The Region's information systems are not able to track DFO fishery management costs against individual fisheries, even as commercial fishermen are being asked to share management costs with DFO.

In the area of habitat protection, there are few readily available indicators that would help members of the public identify where or how policies are being met or guidelines observed.

Many of the complex issues DFO faces do require intensive study and consultation. However, in some instances ongoing study seems only to be delaying or avoiding difficult and controversial decisions.

The Canadian government is obligated to apply the precautionary principle, as the result of its participation in a number of international agreements and protocols. However, the government's interpretation of the meaning of the principle leads to a lack of clarity and transparency, and perhaps even to incorrect application of the principle or failure to apply it. DFO Pacific Region is not applying the principle appropriately.

Budget Issues

Drawing from the analysis in section 4, it appears that at least three types of budget issues challenge DFO Pacific Region's ability to perform on its conservation mandate:

Budget shrinkage (amount of money): The level of funding for conservation programs has been shrinking for at least a decade, with continuing reductions announced and in prospect.

Lack of continuity (re-programming to meet the demands of the day): Major and arbitrary restructurings in the Region have resulted in placement of less well qualified or even unqualified personnel in a number of key positions in the agency. Added mandates are not always accompanied by added funding.

Surges of short-term funding: While the added funding is often useful, it sometimes has negative effects. New money may have conditions attached regarding how it is to be spent, which may require shifting away from older core funding programs. However, the conditions are not always honoured.

In 1997, the scheduled reduction of special program funding, such as the Fraser River Action Plan, Skeena Green Plan and Habitat Action Plan, eliminated most of the operating money as well as salary for several staff. The A base budget, which was mainly salary, was reduced by about 30%. Combined, the reduction in operating money was estimated to be about 70%.

Recent Habitat Management funding illustrates all three of these issues. There were large budget reductions in the 1995-8 period. Then, between 1998 and 2001, there was a large increase in specifically directed funding under the Canadian Fisheries Adjustment and Restructuring Program. Following the termination of that program in 2002, the full impact of the cuts has been felt.

Pat Chamut, at that time ADM Fisheries Management, said: "By the year 2000, Fisheries Management anticipates budget cuts totaling about 40 percent of the total available at the start of the exercise, and a total reduction of up to 36 percent of the staff" (Transition newsletter No. 15, Feb. 2,1996).

Political Influence

This problem affects all federal ministries. It is manifested perhaps most clearly in the exercise of Ministerial discretion. Too frequent political interference can have a chilling effect on employee motivation, leading staff toward inaction or the appearance of action masking the reality of paralysis or indecision.

External Relations and Shared Responsibilities

DFO Pacific Region shares responsibility for conservation activities with other federal agencies, with a variety of international bodies, and with provincial, regional and local government agencies. Conflicts between mandates and different interpretations of mandates across these agencies complicate DFO's work. This can be particularly troublesome for implementation of the DFO conservation mandate if the agency with which responsibility is shared has a pro-development orientation.

Bureaucratic Complexity

DFO Pacific Region deals with a complex and rapidly changing array of subject matter. Management of individual fisheries grows more complex each year. Expanding knowledge of fisheries and oceans interactions, causes and effects means that analysis and assessment tasks and requirements will become more complex in the future. Organizational structure and staffing should reflect this increasing complexity. However, the levels of staffing, responsibilities and qualifications of the personnel do not appear to be keeping pace with shifting and changing demands.

Bureaucratic complexity is also manifested in the balance of decision-making between national headquarters and the Region. National needs and priorities – political, economic, and budgetary – may in some cases take precedence over regional concerns.

Conflicting, Changing and Expanding Mandates and Direction

All federal ministries deal with mandate change. Problems arise when mandates are internally contradictory or not clearly defined, or when there are unanticipated consequences of changes in mandates or operating practices. Conflicting objectives and mandates may weaken the ability and resolve of employees to implement the conservation mandate. For example, economic development and international trade considerations may be viewed as more important than conservation.

Weakness of Enforcement

DFO is apparently unable to effectively enforce the Acts and regulations that comprise its conservation mandate. Possible reasons for enforcement weakness include: limited funding and equipment; over-reliance on the criminal law system, staffing weaknesses, a selective approach to enforcement, political interference and shared enforcement responsibility.

5.3 Case Studies

Following are descriptions of twelve case studies that explore whether and how the core challenges listed above are illustrated in specific areas of conservation. The case studies were chosen to provide examples of DFO's performance on the objects of conservation: species and stock conservation, habitat and ecosystem conservation, and fisheries conservation. They are also representative of the eight areas of responsibility most relevant to conservation: enforcement, science (including assessment), freshwater habitat management, marine ecosystem management including marine protected areas, enhancement, fisheries management and aquaculture.

The final case study in the series, which deals with habitat issues, differs from the others in that it assembles findings from a number of case study situations, rather than focusing on just one. This treatment is warranted because of the complexity and diversity of the habitat subject matter.

While we focus to some extent on problems, we also analyze successes – or positive examples of conservation effectiveness – identifying where and why things work effectively. Most of the case studies exhibit areas of mixed or debatable success.

See section 2.5 for an explanation of our approach to the case study selection and analysis.

The references reviewed in the preparation of each case study are located in Appendix 8.2.

5.3.1 Groundfish/Rockfish Conservation Area Policy

This case study deals with DFO's role in meeting its conservation mandate in actions related to the BC groundfish fishery. It relates to all of the eight areas of responsibility of concern, (with the exception of aquaculture) and each of the objects of conservation – fish, habitat and fisheries. The time period covered is from 2001 to the present day.

The Story

Regulation of the groundfish fishery illustrates a number of issues, including weaknesses in stock assessment, mixed stock fishery and bycatch issues, effects of changes in value of managed stocks and benthic impacts of the trawl fishery.

Fisheries continue on groundfish even though catastrophic declines of inshore rockfish stocks have been noted for many years by DFO scientists, First Nations people, Environmental Non Governmental Organizations (ENGOs), commercial and recreational fishermen, DFO managers, and PSARC. There appears to be a disconnect between the scientific information generated by stock assessment efforts and the conduct of fisheries (Wallace and Ardron 2003).

A number of problems with the stock assessment process have been noted. DFO has been shown to have a chronic inability to develop unambiguous records of catch by volume, species and area. The "Catch-22" nature of rockfish commercial fishery controls is also identified as a possible source of unreliable data: "Catch is determined by quotas; quotas are based on catch" (Glavin 2001a).

Research by Glavin has concluded that inshore rockfish catch information is unreliable in part because of the continuing changes in fishing rules and practices, such as limited entry, creation of new categories, changes in market demand, area closures and movement of the fleet from one area to another (Glavin 2001a). Finally, by-catch issues complicate rockfish stock assessment,

with impacts from the halibut fleet, hook and line fisheries and inshore trawling being the most significant (Pacific Fisheries Management, Inc. 2003).

Glavin suggests that one reason for the disconnect between groundfish stock assessment and fisheries management is the absence of clearly defined conservation objectives in Integrated Fisheries Management Plans. He points out that "DFO scientists are expected to provide advice to managers in design and prosecution of fisheries for which there are no clearly defined conservation objectives," and states that scientists are being asked to answer cultural questions (Glavin 2001a).

In June 2001, a World Oceans Day coalition of 26 BC environmental non-government organizations (ENGOs) called for immediate and total commercial and sport fishing closures for Georgia Strait lingcod and rockfish, to arrest drastic declines in stocks and to permit DFO to develop more accurate stock assessments and develop management plans to aid rebuilding.

Perhaps in response to this expression of concern by the ENGOs, in December 2001, then Fisheries Minister Dhaliwal issued an "ultimatum" to the fishing industry, to end the plundering of rockfish reefs by April 2002, or face shut-downs. Although shutdowns did not take place, DFO did announce significant cuts in commercial and recreational rockfish quotas, as well as increases in monitoring, in May 2002. The ENGO representatives criticized these measures as insufficient to achieve conservation objectives.

Instead of focusing on quota cutbacks, during the past three years conservation efforts, discussions and debates have centred on proposals for establishment of harvest refugia or conservation "no take" areas, and recommendations for immediate, short-term closures of specified recreational and commercial fisheries (some commercial fisheries have been closed since the early 1990s).

ENGOs have called for an outright moratorium on directed rockfish fisheries in the Georgia Strait, alleging that the information available is neither scientifically defensible nor sufficient to justify any directed harvest (Wallace and Ardron 2003).

DFO engaged in multi-stakeholder consultations on rockfish conservation in 2003, and designated Rockfish Conservation Areas (RCAs) in 2004 (DFO 2004a, DFO Pacific Region 2004a and b). However, there is concern about whether there will be sufficient DFO enforcement resources to make the "no-take" conservation areas effective. Fishermen may not be familiar with the boundaries of the RCAs, which were not identified in the 2003-05 BC Tidal Waters Sport Fishing Guide. Further, ENGOs argue that the RCAs should be no-take zones for all fisheries, not just rockfish (pers. comm. Laurie MacBride 2004).

NGOs, although acknowledging the DFO designations as better than nothing, noted that the methodologies used to evaluate the areas will lead to "partially protected" rather than fully protected areas. In August 2004, a member of the Pacific Marine Conservation Caucus (MCC) wrote to the (DFO-established) Rockfish Conservation Committee, outlining the Caucus' scientific concerns regarding the selection of RCAs, and questioning why the MCC had been excluded from participation on the Committee (Ardron 2004).

DFO's current Rockfish Conservation Strategy was the subject of recent province-wide consultations. Results of the recent consultations are not yet available (DFO 2004a).

Parks Canada recently announced its intention to extend the existing RCA in the Broken Group Islands to cover the waters in Pacific Rim Park, via a hook-and-line closure. The Vancouver Sun

(Dec. 8, 2004) reported that DFO disagrees with the proposed closure and "is calling on public support to prevent" this "ban on sport fishing."

DFO's recent actions attempting to meet its conservation mandate for groundfish have been in the right direction, but generally not strong enough to be effective. The conservation priority has been counter-balanced, perhaps even over-ridden, by the objective of providing commercial and recreational fishing opportunities. DFO's ability to meet its conservation mandate in this case is weakened by budget shortfalls that limit its ability to assess stocks and enforce regulations.

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2.

Inadequate Information

DFO has developed insufficient information on many groundfish stocks, in particular those deep-dwelling stocks that have only recently become commercially popular, that make up a growing percentage of total catch, and for which there are no catch limits.

Lack of Transparency and Accountability

DFO has misapplied the precautionary principle, justifying the continuation of fisheries on weak and threatened stocks by the absence of data that might support closure in the interest of conservation. In other words, postponement – not implementation – of conservation measures is justified by absence of adequate scientific information.

Budget Issues

Insufficient budget is allocated to science and assessment of groundfish. Glavin estimated that only $5 million of the Pacific region budget is allocated to groundfish, although the fishery directly and indirectly contributes roughly $250 million annually to the BC economy (Glavin 2001a).

Conflicting, Changing and Expanding Mandates and Direction

The coming into effect of the mandatory provisions of SARA should, but may not lead to improved conservation activity regarding COSEWIC-listed species, such as boccacio (a species of groundfish).

5.3.2 Sablefish/Black Cod Quota Fishery

The sablefish fishery provides an example of a quota fishery that has had some conservation success since its inception in 1981, applying collaborative management and funding of science and enforcement activities to achieve a sustainable fishery. DFO has been a major player in these efforts. However, in recent months, efforts to establish sablefish aquaculture in the province threaten to undermine the accomplishments of the fishery. The provincial government is championing industry in its efforts to establish sablefish aquaculture. DFO is playing a secondary but possibly important role.

Areas of responsibility that this case study relates to are:

- Science/assessment
- Enforcement
- Fisheries management

- Aquaculture

The time frame covered is from 1981 to the present day. The case study deals with two objects of conservation: species and fisheries.

The Story

Pacific sablefish, or rock cod, is found only in the waters off Alaska, Washington and British Columbia. BC catch in recent years has averaged 3000 tons. The Canadian sablefish industry has an annual landed value of between $20-30 million, with more than 90% of the catch being exported, primarily to Japan. Fewer than 50 license holders pay roughly $1 million in fees to the government annually, and spend more than that on the management costs of their fishery (Canadian Sablefish Association (CSA) 2004, Wickham 2002).

CSA reports the following current industry statistics. "Industry investment in commercial licenses, quota and vessels is nearly $300 million. The fishery employs 300 fishermen directly, and 300 more in offloading, processing and distribution. Harvesting methods sustain minimal by-catch and stock abundance is as strong as when the fishery began" (CSA 2004).

The co-management program, in which DFO and CSA members are partners, has evolved over the years, steadily adding activities and budget as new issues and opportunities are identified. As of 2002, the co-managed activities included:

- Funding of all or part of 13 DFO positions
- Contracts for science, assessment, management and enforcement activities
- Science coordinating committee
- Legal and accounting costs
- Executive director's contract
- At-sea observer program

The fishery limits the annual quota of production and conducts ongoing research and assessment to ensure that stocks stay healthy. DFO and CSA members cooperate in tagging work, to determine numbers of fish, growth rates and migration patterns. Association members pay for much of this research, and share with DFO in determining its content and direction. Research findings led to requests for reductions in catch in the years 1995, 1996 and 2001, to help stocks recover from identified weakness.

The current annual research and stock assessment budget, co-managed by DFO and CSA, is approximately $800,000. It funds stock assessment, tagging and biological sampling as well as research on climate change effects, selective harvesting and by-catch reduction.

A variety of enforcement activities are co-funded by DFO and CSA. The fishery retains a security firm as its "self-inflicted spy network." It pays part of the salaries for DFO enforcement personnel, who engage in such activities as dockside monitoring and processing plant monitoring. Total industry contributions to the co-managed fishery are approximately $2.4 million annually (Edwin Blewett and Associates 2002).

In recent months, the wild sablefish industry has become concerned that the provincial and federal government are approving foreshore leases for sablefish aquaculture without, they say, adequate consideration of adverse environmental impacts. They allege that these approvals – some of them to salmon farming companies – represent a governmental effort to assist

aquaculture companies in diversifying out of (less profitable) salmon farming into (hopefully more profitable) sablefish farming.

The first sablefish fingerlings had been introduced into two fish farms on the BC coast as of September. Approximately forty new farms have been permitted in BC in the past year. Eighteen of these licenses were granted to existing fish farming companies, seeking to expand at their present sites. Some of the remaining licenses represent licenses for new sites, many of which have also gone to fish farming companies. CSA fears that the same problems experienced with salmon farms – disease, pollution and over-production – will affect the sablefish fishery. Its executive director notes that "wild sablefish spawn offshore, but spend three to five years in inlets" – in many cases the same inlets where sablefish farms will be located (Robbins 2004).

David Suzuki Foundation (DSF) asserted in September 2003 that DFO and the province had approved sablefish – and halibut – farm licenses without appropriate public consultation, environmental or economic impact assessment. DSF and CSA felt that risks of sablefish farms could include health risks in the inlets where fish farms and the juvenile rearing areas of wild fish would co-exist (WorldSeafoodForum.com 2003). CSA is also concerned about genetic manipulation of the farmed fish and possible genetic damage to wild fish if farmed fish were to escape. Citing the migratory nature of sablefish, CSA notes that these negative impacts on wild stocks could spread to Washington, Alaska and Oregon. (CSA 2004)

In May 2004 the Chair of the House Standing Committee on Fisheries and Oceans wrote DFO Minister Regan, pointing out that "your Department has statutory obligations under CEAA, as well as the Fisheries Act and the Navigable Waters Protection Act, to ensure the proper assessments are conducted before the approval of any commercial sablefish farming operations" (Wappel 2004). An issue assessment report and a risk assessment report were prepared, both in 2004 (Robichaud et al. 2004, Stephen and Fraser 2004). The quota fishery established for sablefish is generally regarded as one of the more successful examples of this type of fisheries management (Jones 2003, Edwin Blewett and Associates 2002). DFO and industry have worked together effectively for the past twenty years, expanding and deepening their cooperation. Thus the sablefish quota fishery may be classified as a success for DFO in the area of fisheries conservation.

Recent efforts to establish sablefish aquaculture threaten to undermine much that has been achieved with the wild fishery. DFO may have failed to meet its conservation mandate by permitting this expansion to proceed without adequate environmental reviews or safeguards to prevent damage to the wild fishery.

This may be the one of many instances in which DFO's ability to meet its conservation mandate will be compromised or hindered by its perceived mandate to "encourage aquaculture" – this wording contained as one of the seven or eight objectives in a number of fisheries management plans. Halibut aquaculture leases are also being proposed by industry and the province, and reviewed by DFO, at the present time.

Note that the scope of this research does not include socio-economic impacts of quota fisheries – impacts that have been a serious concern to many interests in B.C.

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2. It includes conservation successes related to the wild quota fishery, and failures in the actions related to aquaculture.

Inadequate Information

DFO and industry worked well together to develop information on the sablefish resource, which was and is intended to provide the basis for sustainable management of the resource and the fishery.

On the other hand, DFO appears to have neglected its conservation responsibility regarding approvals of sablefish aquaculture licences, giving insufficient consideration to possible risks to the wild stock.

Lack of Transparency and Accountability

Management actions related to the sablefish quota fishery have been open and transparent, and generally acceptable to both DFO and those directly involved in the industry. (There are, however, many critics of the individual transferable quota fishery who believe it has had negative social and economic impacts on those who have not benefited as licence holders. This debate is beyond the conservation focus of this report.)

Budget Issues

The budget to support the quota fishery has drawn upon industry and DFO resources, and has been adequate to fund the steadily growing list of activities.

Political Influence

In the case of the quota fishery, over the years the duration of the agreement between DFO and industry has been extended out to longer periods than the one-year contract that is more typical for co-management agreements. This provides greater security of access for the fishermen. The charges of "intrusive ministerial discretion" that have been leveled at other, shorter co-management agreements do not seem to have been apparent here.

In the case of aquaculture licence approvals, DFO appears to have acquiesced in the province's desire to stimulate sablefish aquaculture, and neglected its responsibility to assess the possible impacts of this aquaculture on the wild stock, and to take action to protect the wild stock.

External Relations and Shared Responsibilities

The quota fishery provides a good example of shared responsibility with an industry group. The Sablefish Advisory Committee is comprised of CSA, First Nations, groundfish fishermen and other stakeholders. The UFAWU and non-affected fishermen are not involved. It, like other quota fisheries, has some detractors who feel that the arrangement is exclusionary.

Conflicting, Changing and Expanding Mandates and Direction

DFO seems to be placed in a conflict situation between its mandate to protect the wild stock and sustain the fishery, on the one hand, and its objective of helping to stimulate aquaculture, on the other.

Weakness of Enforcement

In the case of the sablefish quota fishery, industry, DFO and independent observers have worked out a regimen between them that provides effective enforcement of the rules that have been established for conduct of the fishery.

5.3.3 Rivers Inlet/Smith Inlet Sockeye Salmon

This case study examines DFO's role in dealing with the collapse of sockeye stocks in Rivers Inlet and Smith Inlet– what was done before the collapse, what might have been done to avoid it, and what has been achieved in the way of rebuilding since 1996.

DFO was a major actor in this case study, responsible for all three objects of conservation: species, habitat and fisheries (sockeye). The time period under consideration is roughly 25 years – from the early 1980s to the present day.

Areas of responsibility covered are:

- Primary: Science/assessment; enhancement; fisheries management
- Secondary: Enforcement; habitat management

The Story

Rivers and Smith Inlets are adjacent, with distinct sockeye stocks. Although the combined Rivers and Smith Inlets area sockeye catch was the second largest on the coast for many years (average catches 1.2 million sockeye per year from 1900-74) (PFRCC 2000), the information about the Rivers Inlet stock and its habitats is an incomplete patchwork of short term, incomplete monitoring. There are no credible or consistent counts of escapement or spawners. Consequently, harvest rates are not known. Smith Inlet stocks have had adult escapements monitored by a fence count and juvenile abundance enumerated by acoustic methods. Rivers Inlet has been logged, while Smith Inlet has not.

There have been two periods of apparent decline of Rivers Inlet sockeye: from 1975 to 1995 there was a moderate decline; from 1996 to the present there has been a sharp decline (PFRCC 2001). The moderate decline coincided with logging of the two largest watersheds (McKinnell et al. 2001) and with a possible ocean regime shift. However, during that period the Smith Inlet stock abundance increased. As both Rivers and Smith Inlet stocks would have been subject to the same ocean conditions, it might be assumed that the logging in Rivers Inlet was a cause of the decreased production there.

The sharp decrease in 1996 was associated with a change in ocean productivity (Beamish et al. 1999) and both stocks were affected. The combined stocks decreased from an average total stock that may have been 1.7 to 2.0 million from 1900 to 1974, to 48,000 from 1998 to 2001, with a low of 9,500 in 1999. The fisheries have been closed since 1996 in Rivers Inlet and 1997 in Smith Inlet (PFRCC 2001).

DFO has failed to protect the habitat for key spawning rivers from forest harvesting impacts as logging in Rivers Inlet has removed many of the trees from key spawning watersheds. Yet there is no basis for quantifying impacts because there are no measures of actual spawners or of habitat capacity before and after logging, which are both needed to demonstrate impacts. Although DFO started a pre-harvesting baseline study from 1968-71, it was terminated in favor of a generic

Carnation Creek logging study, which was subsequently cut. Most of the baseline study information has been misplaced. Consequently, there is little information on or ongoing monitoring of forest harvesting impacts. This could be attributed to a low priority being placed on such activities and the high cost of working in this area. DFO implemented conservation actions by way of reductions in catch in 1996 that were too little and too late. In 1995-6 in Smith Inlet, and 1994-5 in Rivers Inlet there were commercial fisheries when the total returns of each stock were less than their target escapement (DFO 2001). It took until late 1999 to form a committee to draft a recovery plan and until 2000 for remedial enhancement to be initiated (Holtby 2000). The company that caused most of the problems is long gone. WFP is operating responsibly and has restored a large side channel as a spawning channel and done other remedial work.

Since 2000, individual sockeye spawning populations in both watersheds have been hatchery enhanced to increase their survival (Hilland 2004). Enhancement efforts seem to have had positive effects, though stocks are recovering slowly. Enhanced fish were marked as part of the recovery plan, but there may not be sufficient resources available to collect and analyze the marks on returning adults. There have been experiments with an acoustic counter to enumerate Rivers Inlet sockeye escapement. Results suggested that, given a full cycle to observe a range of sockeye migration behaviour patterns, the counter might provide usable estimates. However, the counter was not operated in 2004 because of a funding shortfall.

This was not a case of "information ignored" but rather a case of absence or lack of information.

Core Challenges

This case study illustrates the following Core Challenges, as described in Section 5.2.

Inadequate information and inadequate budget resources

The earlier decrease in Rivers Inlet stocks was probably contributed to by failure to monitor logging impacts and implement policy direction on habitat protection. Lack of monitoring of ocean productivity meant there was no early warning of the reduced ocean survivals before the 1996 collapse, such that returning depressed stocks were over-harvested. Although that stock collapse is attributed to adverse ocean conditions, inadequate information and inadequate budget resources were major factors contributing to the slow response time. While stock abundance is slowly starting to rebuild, a sound information base is still lacking and will continue to pose a major risk until there is a serious investment in assessing escapement.

External Relations and Shared Responsibilities

Both DFO and the provincial government could have stopped poor logging practices in the area. Both levels of government approved logging plans that resulted in much of the damage. It is unclear whether they were aware of the problems related to bad logging practices until long after the damage had occurred. The desire of both levels of government to sustain employment in the area could have been a factor in not addressing the impacts of logging and fishing earlier. There was no accountability or public reporting on either issue. The impacts of forest harvesting on salmon habitat were reported on a number of times by members of the fishing industry, specifically those involved in the fall tour to count spawners. The logging company that caused most of the damage in this area has since left the industry. Assessment work in the area has decreased since the PFRCC recommended that it should be increased.

5.3.4 Cultus Lake/Sakinaw Lake Sockeye Salmon

This case study examines DFO's role in dealing with the collapse of the Cultus and Sakinaw Lake sockeye stocks: what was done – or not done – before the collapse, and an assessment of the recovery efforts that have begun in recent years. The case study deals with all three objects of conservation: species, habitat and fisheries.

Areas of DFO's conservation responsibility represented in this case study are:

- Science/assessment
- Enforcement
- Habitat management
- Enhancement
- Fisheries management
- SARA

DFO was a major actor in this case study, sharing responsibility in some areas with Environment Canada, the province and local government agencies. The time period under consideration is from 1980 to the present day.

The Story

The Sakinaw and Cultus Lake sockeye stocks are both minor, but genetically distinct stocks, which means that they are genetically irreplaceable. These stocks migrate through fishing areas at the same time as much more abundant stocks that the fisheries are managed for. However, these two stocks do not have the same productivity or vulnerability as these other stocks. Consequently, Sakinaw and Cultus Lake sockeye stocks were regularly over-harvested. The freshwater habitat of the Sakinaw stock has been degraded by development. Uncontrolled logging in Washington State resulted in debris flows that have degraded the Cultus Lake system habitat. Milfoil weed is also a problem. The spawner survival of Cultus sockeye has been reduced by earlier upstream migration and resultant increased susceptibility to, and mortality from, a parasite. This change in behavior may be natural or triggered by an unknown man-made cause. In addition to over-harvesting, these and other factors have resulted in a long-term decrease in abundance of both stocks to dangerously low abundances. Because of this, both stocks were recently proposed for listing as stocks at risk under SARA (DFO Pacific Region 2004a). Both stocks also suffered from the problem of a long lag time from recognizing the declining abundance and causes to addressing them.

Over the past 12 years (3 generations), the abundance of both Cultus and Sakinaw Lake sockeye has declined by more than 90%, with mean Sakinaw escapement since 1996 at only about 80 sockeye and Cultus down to 500 in 2001 (DFO 2003).

The proposed restoration opportunities outlined by DFO for Sakinaw sockeye include increasing escapements by reducing fishing mortality, short term hatchery increase of fry survival, restoration of natural spawning habitat, and reduction of competitors and predators (Sakinaw Sockeye Recovery Team 2004). For the Cultus stock, local enhancement and fisheries management strategies have been changed to reduce harvest rates and research is ongoing to discover what triggers the early migration. Cultus restoration activities include enhancement,

possibly captive brood stock, habitat restoration and increased monitoring (Cultus Sockeye Recovery Team 2004).

It had been hoped that the SARA rating would give DFO an increased ability and greater resources to deal with local habitat and fisheries issues. However, on October 22, 2004, Minister of Environment Dion, in a joint release issued with DFO Minister Regan, announced that Species at Risk Act protection would not be given to these two species. They observed:

> "listing ……..under SARA could cost the sockeye fishing industry $125 million in lost revenue by 2008. There would also be significant impacts on First Nations Food, Social and Ceremonial fisheries, many coastal communities dependent on the fishing industry, sports fishing, tourism and other related industries.
>
> "It is not possible for fishers to visually distinguish Cultus and Sakinaw Lake sockeye from other larger sockeye populations, and therefore the Fraser River sockeye fishery would have to be virtually shut down if these two populations were listed under SARA," said Minister Regan. "We have already launched approximately $1 million in initiatives to protect Cultus and Sakinaw Lake sockeye salmon. We have powerful tools in place to protect these species such as the Fisheries Act and our fisheries management plans. We will continue to aggressively pursue our action plan to protect and rebuild Cultus and Sakinaw Lake sockeye populations." (Environment Canada 2004)

The ministers cited as justification the findings of two reports, the first dealing with socio-economic implications (GSGislason & Associates 2004), the second an internal DFO document dealing with financial considerations of listing (DFO Pacific Region Policy Branch 2004).

The findings of these two reports have been challenged– by a working group of the Cultus Sockeye Stock Assessment Team (Cultus Sockeye Stock Assessment 2004) and, more generally, by the Sierra Club of Canada BC Chapter (Sierra Club of Canada BC Chapter 2004). These challenges had not changed the Minister of Environment's decision at the time of writing.

DFO delayed in taking substantive conservation actions regarding these stocks until they had been declared at risk..

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2.

Inadequate Information

Catch statistics for the Cultus/Sakinaw stocks have been described as unreliable or non-existent because of difficulties in allocating catch in a number of mixed-stock fisheries to specific stocks.

Political Influence

DFO apparently erred toward greater risk to keep a number of major mixed stock fisheries open and not forgo catch of other much larger stocks. Perhaps DFO regarded the sacrifice of these smaller, weaker stocks as a necessary price to pay to keep the larger multi-species fishery open.

External Relations and Shared Responsibilities

Many of the habitat-damaging activities, such as logging and low flows, are within the jurisdiction of the BC provincial government or the State of Washington, rather than DFO.

The decision of the Minister of Environment to de-list both species illustrates the effects of division of responsibility between the two ministries – DFO and EC.

Weakness of Enforcement

It is believed by some that illegal fishing and poaching may have had a significant effect on both the Sakinaw and Cultus sockeye (Cultus Sockeye Recovery Team 2004, Sakinaw Sockeye Recovery Team 2004).

5.3.5 West Coast Vancouver Island Aquatic Management Board

This case study traces the evolution of the West Coast Vancouver Island Aquatic Management Board (WCVI AMB). It relates to all areas of DFO's conservation responsibility. The charter of WCVI AMB is to achieve "integrated management of aquatic ecosystems in the management area."

DFO has been one of a large number of participants in and funders of the Board's activities. The time frame for the analysis is from 1994 to the present day.

The Story

The long gestation process that led to the present WCVI AMB (the Board) began in 1994, when the West Coast Sustainability Association (WCSA) was formed, to attempt to give the Nuu-Chah-Nulth Tribal Council (NTC) region a greater voice in habitat and fisheries decisions. By May 1997, WSCA and NTC had brought together 70 groups, which agreed to cooperate in the Regional Aquatic Management Board (RAMB). The RAMB was later formalized into the Regional Aquatic Management Society (RAMS) (West Coast Vancouver Island Aquatic Management Board 2004).

In 1998, the federal Panel Studying Fisheries Act Partnering issued the following status report on what was then RAMS.

> "The panel would also like to report on a regionally based initiative on the West Coast of Vancouver Island. Several communities have come together to develop a capacity to prepare new initiatives and to put in place a joint management mechanism. The capacity is to build on six principles – inclusivity, fair and equitable representation, membership endorsed by fishery interests, recognition of international obligations and maintenance of First Nations obligations. The various interests in the communities have agreed to these principles.
>
> "The Regional Aquatic Management Society (RAMS) has already received the blessing of the Nuu-Chah-Nulth Tribal Council as well as the federal and provincial governments. The society includes First Nations, regional and municipal governments and many stakeholders. It is already developing specific projects for enhancing aquatic resources in the region. It is also currently working on establishing a board and a trust to promote new developments. It expects the board to be fully operating in 1999" (Savoie et al. 1998).

The establishment of this board and trust (the current WCVI AMB) did not take place until 2002. Part of the delay in the late 1990s was occasioned by reviews undertaken at DFO Ottawa, where this institution was regarded as a "national pilot." The first executive director was hired in 2002.

As of late 2004, the Board had developed a long list of projects in which it was involved, but was still developing its strategic plan. It noted that "Without receiving its full budget, the projects were pursued as capacity and partnerships permitted" (WCVI AMB 2004).

A "thorough evaluation" of the Board is now being conducted for the sponsoring governments. It is expected to be completed at some point in 2005 (WCVI AMB 2004).

Some have questioned the need for this type of local decision-making body, viewing it as unnecessarily duplicative of existing fisheries management advisory processes. In 2001, the BC Seafood Alliance noted that the proposed RAMS/WCVI system of "Aquatic Conservation Trusts…..that could hold, allocate, and reallocate harvest privileges on a area basis" would totally revise the Minister's authority for managing access to marine resources. The Alliance did, however, see a role for institutions like the WCVI AMB in such areas as water use planning and operational aspects of salmon enhancement and habitat protection (B.C. Seafood Alliance 2001).

This case study illustrates the difficulties associated with achieving meaningful community-based management of fisheries and aquatic activities. Despite years of planning and an ambitious agenda of current projects, the Board struggles to deal effectively with the wide range of activity it has undertaken.

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2:

Budget Issues

DFO (and other funders as well) have not contributed enough funding to the Board to permit it to carry out its program of activities effectively (Tank 2004). So, rather than effectively managing aquatic resources in its management area, it is limited to "being involved" in a wide variety of projects at differing levels of effectiveness.

Lack of Transparency and Accountability

While DFO has moved towards shared decision-making by being involved in the WCVI AMB, it has not ceded any real authority to the Board. At present funding levels the Board serves more of a consultation and sounding board function than a management function.

Bureaucratic Complexity

It appears that the Board may be the victim of differing priorities between different levels within DFO. Lower-level, more local staff may be more interested in providing the Board with real funding and real powers; higher level DFO staff less so – especially if there is the prospect that such a fully-empowered regional management institution might set a precedent that could be followed in other areas of the Pacific Region.

External Relations and Shared Responsibilities

At this point in its evolution the Board has not succeeded in the attempt to meaningfully share decision-making and management responsibility with the many stakeholder groups that comprise its membership. DFO – and the provincial government – have encouraged the Board into existence and continue to promote it as an effective management vehicle, yet it is far from meeting its full potential.

5.3.6 Georgia Strait Coho Salmon

This case study examines DFO's role in coming to grips with and eventually dealing with the issue of conservation of coho stocks in the Georgia Strait and a variety of fisheries on those stocks. During the time period under study – the 1980s and early 1990s – DFO had a higher priority on sustaining fisheries than the fish, until the abundance of fish had decreased to dangerously low levels. At that time, management to sustain the fish took precedence.

This case study involves the following areas of responsibility: science and assessment, enforcement, habitat management, enhancement and fisheries management (in particular mixed stock fisheries).

The Story

Coho spawner abundance had declined since the 1950s and dropped rapidly in the 1980s. Exploitation rates for natural coho were commonly at least 10% more than the sustainable rate of 65-70% (PFRCC 2002). That sustainable rate decreased when ocean productivity and marine survival decreased from 8-18% in the 1980s to 1% or less by 1998 (DFO 2004). Changing marine conditions also affected the ocean distribution of coho. Until the mid-1990s, in most years 50% to 60% of the coho reared in Georgia Strait and the remainder reared off the WCVI. From 1991 to 2002, fewer coho reared in the Gulf – four years at less than 10% and five years at less than 40% (DFO 2004).

DFO knew, as early as the 1980s, that coho were being over-fished (DFO 1986b). A 1986 DFO report clearly showed that Georgia Strait coho were in a long-term decline and that over-harvesting was the main cause. It also determined in which fisheries the over-harvesting was occurring (DFO 1986a,b). In 1989, the DFO Pacific Scientific Advice Review Committee recommended reduction of harvest rates (DFO 2004). However, the Department did not act until 1995 and 1998, deferring to the perceived interests of the commercial and recreational fishing communities.

Development around the Strait of Georgia resulted in the degradation and loss of coho freshwater habitat (DFO 1986a). Much of the development in the Georgia Basin does not meet DFO direction to achieve 'no net loss' or 'net gain' of habitat capacity. Most development was approved by provincial or municipal agencies that DFO deferred to. A number of local restoration projects in the area have partially compensated for some losses.

Many coho populations in the Georgia Basin area were enhanced to supplement wild coho production and increase catches (DFO 1977), but are now just compensating for losses that resulted from habitat damage and over-harvesting. Enhancement produced more fish for harvest and stimulated higher commercial and recreational harvest rates than natural populations can sustain. Also, enhanced production in mixed stock fisheries may have masked wild stock declines. The majority (over 70%) of coho in the Strait of Georgia are now hatchery produced (Sweeting et al. 2002).

There were intensive fisheries on Georgia Strait coho by the commercial troll fleet on the WCVI and in Georgia Strait by the sport and Gulf troll fleets. The Gulf trollers have not been able to retain coho since 1995. The WCVI troll catch is now limited by a Pacific Salmon Treaty catch ceiling. The Georgia Strait sport fishery harvests a significant portion of coho stocks, ranging from 750,000 in years when coho rear in the Gulf to 160,000 when they rear on the WCVI (DFO

2004). South Coast coho catches decreased from 1.55 million in the mid-1980s to almost zero from 1995 to 1998, and have been low since then (DFO 2004). Recently, DFO introduced regulations that allowed sport fishers to only retain adipose clipped hatchery coho and required release of all unclipped, wild coho caught in the Georgia Strait.

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2.

Inadequate Information

DFO apparently felt that:

- It had to prove to fishing groups that there was a serious enough problem to justify reducing harvest rates.
- Information available was too weak to justify reducing or closing fisheries.
- More monitoring and assessment was required from 1989 to 1995 to justify closing the Gulf troll fishery and from 1989 to 1998 to justify closing the sport fishery.

Political Influence

Although DFO had adequate information available to provide a scientific warning in 1989 on the need to reduce harvest rates, it was unable or unwilling to close or limit fisheries in the interest of conservation until 1995 and 1998. It appears that these delays were prompted by DFO's unwillingness to act against the perceived interests of the commercial and recreational fishing communities.

The key issue is that DFO did not take enough conservation actions to stop the decline in stock abundance until 1998 even though:

- the coho spawner abundance had been in decline since the 1950s;
- there was clearly a problem by the mid-1980s;
- the problem was getting worse through the late 1980s;
- PSARC recommended conservation actions in 1989; and
- coho non-retention by Gulf trollers was implemented from 1995 on.

At that time, all south coast fisheries that catch coho were closed, and coho non-retention and selective harvesting were required in many fisheries in BC. If DFO had acted sooner, would the required fishery reductions have been smaller and the coho stock rebuilding times shorter – would the costs and risks have been less?

The PRFCC conclusion on the Strait of Georgia coho was that "for the most part, management actions taken were appropriate and consistent with the productivity and production of these stocks." While this is accurate, the delay in taking those actions placed coho at risk of extirpation as well as ensuring a long rebuilding time.

DFO misapplied the precautionary principle in this case, deferring to fishing interests' desire to continue fishing, even when available data showed serious decline of wild stocks. DFO's attempts to balance these interests were directly at odds with its conservation mandate.

External Relations and Shared Responsibilities

Over-harvest of coho during this time period was part of a DFO sanctioned over-harvest of chinook and coho stocks on the WCVI, in the attempt to pressure the U.S. into signing an acceptable Pacific Salmon Treaty (Pers. comm. R. MacLeod).

5.3.7 Establishment of Oceans Act Marine Protected Areas

There are three federal agencies with marine protected area mandates: Parks Canada Agency, DFO and Environment Canada's Canadian Wildlife Service (CWS). DFO has the lead role in coordinating the federal MPA initiatives.

Canada's commitment to marine protected areas is also expressed in international agreements. For example, Canada has signed on to the agreement from the World Summit on Sustainable Development with a commitment to establish marine protected areas, including representative networks, by 2012 (WSSD 2002).

Of British Columbia's 290,000 sq km of marine waters, less than .1% – or approximately 50 ha – is fully protected, prohibiting all extractive activities (Jessen and Ban 2003 and Ban 2003). The recent OECD Environmental Performance Review of Canada commented that, while Canada has the world's longest coastline, it has no marine protected areas (although the Endeavour Hydrothermal Vents MPA has been designated). It recommended that Canada improve its environmental management by, among other measures, "substantially" increasing the total area of marine ecosystems under protection (OECD 2004 p.23). This case study focuses on progress (or lack thereof) made towards the designation of four pilot MPAs by DFO on the Pacific coast. The conservation object of concern is species/ecosystems, and the relevant areas of responsibility are habitat/ecosystem management and fisheries management. The time frame of concern is 1998 to the present.

The Story

Legislative and Policy Context for Marine Protected Areas

Canada's *Oceans Act* (Section 35 (1)) states:

A marine protected area is an area of sea that forms part of the internal waters of Canada, the territorial sea of Canada or the exclusive economic zone of Canada and has been designated under this section for special protection for one or more of the following reasons:

(a) the conservation and protection of commercial and non-commercial fishery resources, including marine mammals, and their habitats;

(b) the conservation and protection of endangered or threatened marine species, and their habitats;

(c) the conservation and protection of unique habitats;

(d) the conservation and protection of marine areas of high biodiversity or biological productivity; and

(e) the conservation and protection of any other marine resource or habitat as is necessary to fulfill the mandate of the Minister (of Fisheries and Oceans Canada).

A federal-provincial strategy for MPAs has been in the drafting process since 1994, aiming to coordinate all federal and provincial marine protected areas programs under a single umbrella. A discussion paper was published in 1998, but no formal agreement has yet been signed. The discussion paper calls for a joint federal-provincial approach, shared decision-making with the

public and building a comprehensive system of protected areas by the year 2010 (Canada and British Columbia 1998). Reasons that the strategy has not been finalized, according to Jessen and Ban (2003 p.381) include: "lack of a political champion at either level of government to push officials to complete the work, a provincial election, and the lack of support in the nation's capital for a regional approach to MPAs that might differ in some respects from the national approach being put forward by Fisheries and Oceans Canada."

Four Pilot Sites

Four MPA pilot projects were announced in 1998 by then-Fisheries Minister David Anderson, with the expectation that they would be formally declared under the Oceans Act after scientific studies and consultations. That year, four sites were announced – two inshore sites: Gabriola Passage and Race Rocks; and two offshore sites: Endeavour Hot Vents and Bowie Seamount. The intention was to evaluate the MPA development process (DFO Pacific Region MPA Home Page). The process for creating MPAs could then be used at other sites, and the examples could also demonstrate to communities what MPAs will be like. The pilot sites were areas with ecological importance and strong feasibility due to relatively low user pressure. Nevertheless, six years after the 1998 announcements, only one of the four sites has been officially designated – Endeavour Hydrothermal Vents. The other three pilots have not been written into regulations and formally established as MPAs.

1. *Endeavour Hydrothermal Vents*

Endeavour Hydrothermal Vents lie off the southern BC continental shelf at a depth of 2250m. The vents are a unique habitat in an active seafloor-spreading zone, where extreme conditions result in many distinct species, at least 12 of which are endemic to the vents at Endeavour (Fisheries and Oceans Canada, June 2001). The designation of the site as an MPA was announced on March 7, 2003 by then Fisheries Minister Thibault. Given the depth of the vents, and their location 200 km offshore, the only significant user group in the area is the research community, which accesses the vents via submersibles and other research instruments such as anchored platforms. A Planning Team and a Stakeholder Advisory Team comprised of scientists from the research community and an ENGO representative have worked with DFO to produce a management plan with zoning for different levels of research activity (MPA News 2001). Regulations for Endeavour were registered March 4, 2003 under the Oceans Act. An operational plan is being drafted at the time of writing, with input from the Advisory Team.

2. *Bowie Seamount*

Bowie Seamount, located 180 km west of the Queen Charlotte Islands, is a subsea volcanic mountain that rises from a depth of more than 3,000 m to approximately 20 m below the surface. The nutrients that seamounts add to offshore waters attract marine life – Bowie provides habitat for at least 158 marine species (Pynn 2004). The site was selected for its significant populations of rockfish, sablefish and halibut.

Seamounts have been fished around the world since the late 1960s, with negative consequences for their fish stocks. Each case has followed a pattern in which, when commercially valuable stock are first discovered, catch rates are high initially, and then fished down quickly, often in a single season (Dower and Fee 1999). Seamounts are particularly vulnerable to overfishing because of their distance from shore and the difficulty of successful recolonization once they are overfished.

At the time of the 1998 announcement fishing at Bowie Seamount was at low levels, under scientific permit licences. It was primarily focused on yelloweye rockfish and then rougheye rockfish, as populations of yelloweye declined (Dower and Fee 1999). Since then, a commercial fishery has developed, outside of the regular quota licencing system (Patterson in Pynn 2004, Jessen, pers. com. 2004). Sable fishing by trap is key, and a representative of the Canadian Sablefish Association maintains that sable fishing should continue at the same level when the MPA is established. Continued fishing in the area could threaten its ecological values, given the global experience with fishing at seamounts described above.

The Haida First Nation has declared an interest in being part of the process for protecting Bowie Seamount, and DFO has been in discussions with the Haida as well as other First Nations and communities on the BC coast (Ban pers. comm. 2004, Gueret in Pynn 2004). There is an Advisory Committee with various stakeholders, which had not met for over two years at the time of writing.

3. Gabriola Passage

Gabriola Passage is in the Gulf Islands, offshore from the city of Nanaimo. The area has a diverse and abundant ecosystem, with over 230 species of sea life. Initial consultations showed support from a wide cross-section of the community for protecting Gabriola Passage (Fisheries and Oceans Canada Marine Protected Areas Pilot Project Fact Sheet), yet designation has not yet occurred. It is likely that negotiations with First Nations in the area have slowed the process. DFO acknowledged that this pilot would test the development of a draft management plan "in a nearshore area with numerous First Nations, marine stakeholders and community interests" (Fisheries and Oceans Canada n.d.). Conservation groups have recommended that this site be included within the Southern Gulf Islands National Marine Conservation Area, which is in the planning stages under Parks Canada's leadership.

4. Race Rocks

Race Rocks, in the Strait of Juan de Fuca, was already protected as a provincial Ecological Reserve (since 1980). Like the other pilot areas, it has abundant and diverse marine life, including mammals, birds and fish. There are commercial and recreational fishing closures for all invertebrates, rockfish and lingcod in the surrounding waters under the Fisheries Act, though there is recreational salmon and halibut fishing.

The pilot aimed from the outset to be a test of partnering in management planning and ensuring co-ordination among agencies or governments involved in the development of the MPA Strategy for the Pacific coast (Fisheries and Oceans Canada, n.d.). There are over a dozen key stakeholders in the area, and several First Nations have aboriginal and treaty rights. The Race Rocks Advisory Board (RRAB) brought together representatives from federal and provincial agencies, First Nations, sport fishers, sport divers, marina operators, whale watch companies, environmental groups, marine scientists and Pearson College. The RRAB successfully negotiated provisions for management and recommended that the MPA be co-managed by local First Nations, BC Parks and DFO. Minister Dhaliwal accepted the Board's recommendations in 2000. But the designation process faltered when it became apparent that the aboriginal representatives on the Advisory Board did not have a mandate from local First Nations to negotiate on their behalf (LeRoy 2003). Several Douglas Treaty First Nations objected to the designation of the MPA based on a lack of adequate consultation. In 2001, a DFO representative explained that the delay revolved around the right of four First Nations to harvest seafood from the area and

expressed hope that the areas would be finally designated "within a few months" (Curtis 2001). Yet the area has still not been officially designated as an MPA, and over a two-year period there was only one Advisory Committee meeting (Ban, pers com 2004). NGOs and other observers have expressed frustration at the delay: "Dhaliwal has the power under the Oceans Act to simply declare Race Rocks as a Marine Protected Area. This is a win-win scenario that almost everybody wants. Why doesn't he just do it?" (Hume 2000).

Sponge Reefs

There are four sections of 10,000-year-old glass sponge reefs in Queen Charlotte Sound and Hecate Strait that are globally significant. Prior to their discovery it was presumed that this type of reef had long ago died out. A leading palaeontologist from the University of Stuttgart has emphasised their importance (Krautter website). The brittle sponges, which provide significant habitat for juvenile rockfish as well as other species, are fragile and easily destroyed by fishing gear, particularly trawling. Key threats to the reefs also include oil and gas exploration, should the moratorium be lifted (Canadian Parks and Wilderness Society 2004).

In 2000, the BC groundfish trawl fleet committed to voluntarily avoiding fishing in the sponge reef areas, yet trawl gear caused additional damage to the reefs (Canadian Parks and Wilderness Society, July 2002). In 2002, trawl fishery closures were put in place and DFO committed to review the sites to determine if they are appropriate candidates for broader protection measures provided under the Oceans Act (Fisheries and Oceans Canada, July 2002). Yet there has been no public indication that DFO in Ottawa is moving forward on this commitment.

NGOs are dissatisfied with fishing closures as the sole protective mechanism in that they can change annually and they do not recognize the special values to the same degree as a MPA designation. Furthermore, DFO did not commit to reduce total catch in the area, and long lining and other fishing methods, which can have an impact, are still allowed (David Suzuki Foundation 2002). Lack of initiative is attributed to DFO in Ottawa rather than to the Oceans Sector in the Pacific Region. DFO scientists released a report in 2002, recommending that the sponge reefs urgently need protected area status (Jamieson and Chew 2002).

DFO could move to formally declare the site as an "area of interest" for MPA designation. Reasons for lack of such action are not clear, though opposition from the province has likely been a factor (Jessen 2004 pers. comm.).

A PSARC Habitat Science Report (DFO 2000) stated that "The sponge reefs are being impacted by mobile fishing gear. The opportunity for study of the sponge reefs … may not exist in the future without protection."

Overview

DFO has not been successful in facilitating the development of a national MPA strategy that would bring together the federal agencies and provincial governments that need to be involved. This is a role that the Oceans Act calls upon DFO to perform.

In the Pacific Region, DFO has not been successful in establishing MPAs under the Oceans Act, with only one of four pilot MPAs having been established. International commitments such as that made at the World Summit on Sustainable Development have not been reflected in action on the water.

The four pilot sites have few threats that MPA designation will mitigate relative to other places along the coast deserving of protection, though fishing pressure at some is a concern (e.g. Bowie Seamount). "The real test of the Oceans Act – and the federal commitment to marine conservation – will come in the next phase of MPA system development, where significant fishery closures will be the issue to reckon with." (Wallace and Boyd 2000 p.20) The sponge reefs are one possible MPA area that would warrant full fishing closures. The damage to the sponge reefs from trawling would have been preventable by MPA designation and proper enforcement.

Thus far, MPAs are not even remotely meeting their potential to contribute to the protection of marine ecosystems on the Pacific coast. As an editorial in the Globe and Mail concluded in July 2003, "Ottawa can be congratulated for establishing the first marine park, but one deep-sea vent is not an ocean protected. BC needs an MPA network." Then-Minister Thibault put the establishment of the first MPA in a more positive light: "The designation of the Endeavour Hydrothermal Vents as a Marine Protected Area is an important step towards the creation of a national system of Marine Protected Areas which will enable Canada to take its place on the world stage as a protector of marine ecosystems for the benefit of Canadians and other nations." (Fisheries and Oceans Canada, March 7, 2003) In fact, this was a small step that will only prove to be "important" if more, larger steps are taken soon.

Lack of progress means loss of momentum and makes it more difficult to maintain public interest. Among conservation organizations cynicism has been building. The most serious negative impact may be the loss of potential for adding new sites – communities have not been encouraged to come forward with new sites needing protection and they have not seen action on the pilot MPAs on which to build experience. There is currently no formal nomination and evaluation process for new sites proposed to DFO.

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2.

Budget Issues

Lengthy periods between Advisory Committee meetings for pilot MPAs, possibly related to budget and staffing shortages, have resulted in a loss of momentum. The lack of new funding for Oceans Act implementation, including MPAs, from the outset, suggests lack of full commitment to the program from Ottawa.

Political Influence

One cause of delay has been changes in political leaders, with more recent Ministers, since Anderson, taking less and less interest in MPAs in the Pacific Region. There is no obvious MPA champion in DFO Pacific Region or in Ottawa.

Bureaucratic Complexity

Perceptions among MPA supporters on the BC coast are that it is DFO in Ottawa more than the Region that is the source of delay in the establishment of MPAs here. There is a sense that Ottawa is not open to the necessary tailoring of strategies to the BC situation, for example with regard to accommodating First Nations interests.

External Relations and Shared Responsibilities

Public awareness/pressure has not prompted politicians to take on and push forward the establishment of MPAs, largely because the public is unaware of how little of the ocean is protected (Jessen and Ban 2003). In addition, opportunities to begin the MPA designation process through nominations from communities have not been made clear by DFO. This is important because Oceans Act MPAs were not intended to be ecologically representative (as are National Marine Conservation Areas with Parks Canada) but were intended to be more community-driven.

Difficulties in reaching agreements with First Nations have posed a serious hurdle.

Lack of a federal-provincial agreement on an MPA strategy for BC has also slowed progress.

5.3.8 Salmon Aquaculture – Sea Lice Research

This case study documents DFO's role in dealing with the issues related to sea lice impacts on wild salmon, specifically in the Broughton Archipelago, and specifically related to possible connections between the activities of the salmon farming industry and impacts on juvenile pink salmon. Although some have said that the salmon farm-sea lice problem dates back to 1991 (McNulty 2003, quoting Sierra Legal Defence Fund), this case study deals with the DFO research and Action Plan items from 2001 to the present day.

The DFO areas of responsibility addressed are, primarily, science/assessment and aquaculture; and secondarily, enforcement.

DFO was not the primary actor here; the department was at best a co-equal player with the provincial government and a large cast of supporting players. In fact, it could be said that DFO was brought into the issue somewhat against its will.

The Story

Private researchers, such as Watershed Watch Salmon Society and Alexandra Morton (a biologist living in the Broughton Archipelago) raised some of the first alerts about this issue in 2001. While their work and methodology were criticized by DFO and the salmon farming industry, the research activity served to raise public awareness of the issue and the possible connection to salmon farms (Hume et al. 2004, Watershed Watch Salmon Society 2001).

DFO began its own limited research in the summer of 2002, and concluded that there was no connection between salmon farms and the incidence of sea lice on wild salmon. Continued citizen expressions of concern led the PFRCC, which had been independently researching the issue, to convene a public consultation in September 2002, which included DFO representatives and other researchers. The PFRCC followed up this workshop by issuing a report and related advisory, calling for a number of immediate actions by DFO and others to protect the wild salmon, and offering both "high risk" and "low risk" (to the salmon) recommended strategies (PFRCC 2002).

In early 2003, DFO launched a $700,000 Pink Salmon Action Plan, with five major program areas. (DFO 2003a, DFO Pacific Region 2004). At roughly the same time, the provincial government announced its Broughton Archipelago Action Plan which partially adopted

PFRCC's high-risk strategy for fallowing farms along migration corridors. The province also had in place a "voluntary" sea lice monitoring program at this time (BC MAFF 2003a,b and c).

Industry farm-by-farm data was regarded as critical to the quality of the federal and provincial research. However, the industry refused to provide that data, and the provincial government has protected the salmon farmers in their efforts to maintain privacy of data.

During 2002 and early 2003, a variety of international sea lice researchers came to Vancouver for a variety of science forums, sea lice summits and related meetings, reporting on their latest work and pointing out its possible relevance to the BC situation. DFO personnel were in attendance at those meetings (Watershed Watch Salmon Society 2004). This same international information was assembled and made public in PFRCC's report, "Making Sense of the Salmon Aquaculture Debate", which was issued in January 2003 (Gardner and Peterson 2003). This report concluded that:

> "Causality in the spread of sea lice from farmed fish to wild fish in British Columbia has not yet been proven to the highest standard of scientific scrutiny. However, the combination of scientific results from Europe (European Commission 2002, Scottish Executive 2002), preliminary studies of lice on juvenile salmon in B.C. and knowledge of sea lice-salmon dynamics presents a body of compelling evidence that sea lice from salmon farms do impact wild salmon" (Gardner and Peterson 2003. p.69).

DFO and other researchers provided status reports on their research work at a community workshop in Alert Bay in January 2004. In general, research results were inconclusive, though a number of long-term studies had begun. It was noted that future research will be hindered by lack of data, budget, facilities, committed researchers and effective research design" (Gallaugher et al. 2004).

In June 2004, the Broughton Area Stewardship Society was formed, to monitor and report on progress on sea lice research and implementation activity in the area. A grassroots effort, it combines the resources of a number of environmental NGOs, such as Living Oceans Society and Raincoast Conservation Society (Broughton Area Stewardship Society 2004).

In September 2004, Western Economic Diversification (WED) (federal) and the Provincial government (through the Ministry of Small Business and Economic Development and MAFF) established the BC Aquatic Health Centre in Campbell River, with $2.4 million in funding (BC Ministry of Small Business and Economic Development 2004, Kines 2004). It is likely to conduct research on many of the same subjects dealt with in the Broughton case study. It is not clear whether or how DFO was consulted regarding its formation, whether or how DFO will be involved, or what role this facility will have in sea lice research. Industry representatives from such entities as Syndel and BC Salmon Farmers Association will serve on its board. Also, it is not clear whether or how the BC Aquaculture Research and Development Committee (BCARDC) was or has been involved in the establishment of this centre, or in the other sea lice/salmon farm research efforts.

The events of 2002 and later years made the sea lice issue the focus of increased public and scientific attention (Hume et al. 2004). Some research progress has been made, yet many questions remain unanswered and the direction of future research and action remains unclear (DFO PSARC 2004). In recent correspondence to BC ENGOs, Fisheries Minister Regan continues to assert that there are no proven connections between salmon farms and negative impacts on wild salmon (Regan 2004).

DFO-sponsored monitoring has continued, though it has been hampered somewhat by lack of available funding (DFO Pacific Region 2004). The provincial government continues its sea lice monitoring program. (BC MAFF 2004).

Core Challenges

This case study illustrates the following Core Challenges, described in Section 5.2.

Inadequate Information

DFO did not carry out its conservation mandate very effectively in this case. It ignored relevant research and did not act soon enough. It has allowed conditions to exist that put threatened stocks at risk. After ignoring an important research subject until other researchers had brought it to public attention, DFO has carried out what can be described as "rushed science" since late 2002. The current research program may or may not be sustainable over the longer term.

DFO personnel had knowledge of current and recently issued international scientific findings related to this subject, but chose not to relate those findings to the BC situation.

One of the lessons learned is the importance of having baseline research before salmon farms enter an area. While this was not possible in the Broughton, it may be possible to put monitoring/surveillance programs in place in the northern BC coastal waters in advance of the coming of salmon farms, so there will be baseline data to provide a basis for before and after analyses.

Transparency and Accountability

DFO did not observe the precautionary principle in this instance as the principle was originally intended, namely, to act to conserve the resource even in the absence of scientific certainty. The Department did follow the Canadian government's interpretation of the principle, which calls for balancing harm to economic interests if actions are taken against the need to prevent harm to the resource (Government of Canada Privy Council Office 2003). This approach does not provide assurances that wild salmon will be protected while the ongoing studies of potential interactions proceed over many years.

The timing of action in early 2003 was viewed as important to meet conservation ends, in that it would match the timing of the migrations of the juvenile pink salmon. The provincial government delayed implementing "lice free migration corridors," claiming that more and better science was needed, putting the pink salmon at risk.

Conflicting, Changing and Expanding Mandates; External Relations

DFO has responsibility for conservation of the wild salmon resource and also serves as promoter of aquaculture. These conflicting roles, together with a tendency to defer to the Province, may have rendered DFO incapable of acting to conserve the wild salmon resource in this instance.

DFO seemed reluctant to challenge the provincial government on decisions made on fallowing of farms situated on pink salmon migration corridors, even though complete fallowing would have been appropriate as an application of the precautionary principle.

5.3.9 Okanagan First Nation – Skaha Lake Cooperative Effort

This case study describes DFO's participation in a multi-agency cooperative program that was spearheaded by the Okanagan First Nation. The goal of this program is to re-introduce sockeye salmon into Skaha Lake, south of Penticton. The time frame covered is from 1997 to the present.

The case study deals with two objects of conservation: species and habitat, and two areas of responsibility – science/assessment and enhancement.

The Story

The Okanagan Nation, in the summer of 2004, reintroduced sockeye to Skaha Lake for the first time in over a half-century. The effort seeks to reverse almost a century of habitat destruction and blocked migration from Skaha Lake through the Okanagan and Columbia Rivers to the Pacific Ocean. It is regarded as a first step toward the ultimate goal of achieving multi-species, ecosystem-based recovery in the Okanagan Basin, and is expected to increase access to funding for habitat projects that will benefit multiple fish species in the Okanagan Valley (Okanagan Nation Alliance 2004a).

The Okanagan sockeye are only one of two remaining viable sockeye stocks in the Columbia Basin. Prior to construction of multiple dams that began in 1914, several species of salmon migrated to the Okanagan ecosystem. Now only the Okanagan sockeye still return to the Okanagan River in Canada.

The Okanagan Nation initiated the project in 1997, under the direction of elders, following the establishment of its fisheries department in 1995. Three years of feasibility research were undertaken prior to the 2004 re-introduction. Federal and provincial agencies were involved in design of both risk assessment strategies and the implementation plan. Re-introduction-related health research was undertaken between 2000 and 2003, funded by the Bonneville Power Administration in partnership with the Colville Confederated Tribes. It incorporated the expertise of health specialists from the Canadian federal and BC provincial governments.

The program has involved a number of agencies on both sides of the US-Canadian border: DFO, BC Ministry of Water, Land and Air Protection (WLAP), Colville Confederated Tribes (WA), and the Bonneville Power Administration (WA) (Northwest Power and Conservation Council 2003). It has drawn upon and utilized a number of programs and services, such as those of Fisheries Renewal BC, DFO's Aboriginal Fishery Strategy, a DFO-funded Stewardship Coordinator and the Community Futures Development Corporation (CFDC). Fry were raised at DFO's Shuswap Falls Hatchery (Machlin 2000).

The program has combined scientific review and analysis provided by DFO and BC WLAP with utilization of First Nations traditional ecological knowledge and oral history.

The 2004 re-introduction is viewed as the pilot year of a planned 12-year initiative. The program will take an adaptive management approach. Monitoring and evaluation programs will be undertaken to assess possible negative sockeye/kokanee interactions (Okanagan Nation Alliance 2003). It is also possible that warm water species such as bass may be introduced, which could prey on sockeye. The reintroduction of sockeye is viewed as an "adaptable, reversible opportunity" to be tested before expanding from the present limited access to free access for migrating adult sockeye into Skaha Lake (Okanagan Nation Alliance 2004b).

This is the kind of conservation project that represents the best in multi-stakeholder cooperation. Though it is still in its early days, it can be regarded as a success to date, with action steps in place to continue that success over the 12-year implementation period.

The program may be unique because of the presence of sources of US funding, in addition to the variety of Canadian funding sources.

Core Challenges

This case study illustrates the way some of the Core Challenges facing DFO in carrying out its conservation mandate can be successfully addressed.

Inadequate Information

The science accompanying the re-introduction program appears to be well-conceived and comprehensive, with a number of built-in "go-no go" points, should preliminary results indicate problems with the program.

Budget Issues

There appears to be adequate budget to implement the program; DFO's contributions are targeted to take advantage of its unique strengths (science, hatchery assistance, health issues).

External Relations and Shared Responsibilities

The case study shows how DFO can effectively partner with a number of diverse groups and agencies toward common objectives.

5.3.10 Salmonid Enhancement

Recent developments in DFO's enhancement programs illustrate a number of points about DFO's ability or inability to manage during a time when new scientific information about impacts of enhancement is becoming available and budget reductions are occurring. Enhancement has traditionally been undertaken with a production emphasis – in support of commercial and sport fisheries. Recently, there has been an increasing shift toward a "conservation" emphasis – using hatcheries and other enhancement tools in support of conservation, restoration or recovery of species and habitat.

This case study illustrates how difficult it is for DFO to respond to emerging scientific evidence and to develop new ways of doing business, especially when strong economic and political interests resist change. The Salmon Enhancement Program (SEP) has been in existence for the past 30 years. This case study focuses on the events of the past decade.

Areas of DFO conservation responsibility covered are, in addition to enhancement:

- Science/assessment
- Habitat management
- Fisheries management
- SARA

All three general objects of conservation are addressed in this case study: species, habitat and fisheries.

The Story

Over the past ten years or so, research findings in the U.S. and elsewhere around the world are pointing to negative impacts on wild salmon as a result of wild and hatchery fish interactions. DFO research in BC, on the other hand, has looked at the operations of production hatcheries, and has focused on returns, rather than on interactions with wild fish. These studies have been criticized for their short-term nature and for their changing or weak methodologies (Gardner et al. 2004).

Measurements of effectiveness of enhancement activity vary by program type (Gardner et al., Appendix 4). Many complicating factors may limit enhancement success, such as ocean conditions, habitat loss and increased catching power.

Although DFO has developed draft standards for assessment of hatcheries which incorporate some of the latest scientific thinking, it does not appear that these are being applied in practice – and the information is thus not made available to the public. This contrasts sharply with the recently-adopted practices in Washington State, where current and detailed operational data is made available to the public on the Web (Long Live the Kings 2003).

During the past decade in BC, there has been steadily increasing evidence that the presence of large numbers of enhanced fish has contributed to mixed stock fishing problems that result in masking of impacts on wild fish and weakening of wild stocks. Further research into these mixed stock interactions might show that, in some cases, hatchery fish replace rather than supplement wild fish, and thus do not provide any net production benefit/increase.

In 2000, the draft Wild Salmon Policy contained a "strategic enhancement" component. In the December 2004 draft of the Wild Salmon Policy, DFO has stated that "enhancement must become congruent with the Wild Salmon Policy," (Innell 2004). Lill and Kent (2004) have suggested that conversion of some hatchery production to alternative, less impactful, technologies such as unmanned channels and side channels, might be one way to achieve this congruence.

The enhancement budget benefited from short-term surges of funding (e.g., CFAR, HRSEP during the period 1997-2002.). Since the sunsetting of that funding in 2002, cuts in the enhancement budget have been ongoing and dramatic. Innell (2004) noted that, at the present time, SEP has a base budget of $20.62 million, but annual program costs of approximately $24.5 million. It is acknowledged that the roughly $4 million budget gap – which has been funded by contributions from other regional programs – needs to be closed, through some combination of program cutbacks, cost recovery, alternate delivery mechanisms and alternate program funding. And it is further acknowledged that dealing with the $4 million budget gap "may only be the beginning" – as future ongoing departmental and program cuts appear to be in prospect (Lill and Kent 2003).

The Reality Stewardship report (Harvey and Greer 2004) has documented the harmful effects of recent budget cuts on the continuing viability of the many community stewardship groups – with an estimated 10,000 volunteers (Innell 2004) – to which DFO had been downloading costs and responsibilities over the past decade. Public involvement activity now accounts for roughly $3 million of SEP's current $24.5 million in program costs (Innell 2004). Although Lill and Kent (2004) suggest that some hatchery activities might be devolved to non-profit groups, First

Nations and producer co-ops, the Harvey and Greer findings suggest caution in this regard, noting the weakened capacity of these types of organizations.

The SEP budget was cut from $38 million in 1990 to $27 million in 1999, with further proposed cutbacks on the order of 25% in 2002; yet a growing percentage of the shrinking budget continues to go into maintenance and operation of the older, larger hatcheries. Currently, $19.5 million of SEP's $24.5 million program costs go into "fish production" activities of one kind or another (Innell 2004).

Multiple considerations lead to continued operation of large, older production-oriented hatcheries. Even if damaging effects (e.g. mixed stock fisheries and genetic impacts on wild stocks) of major hatcheries on wild stocks could be proven, there would likely be reluctance on DFO's part to close them or scale back their operations. Reasons for this reluctance include: unwillingness to offend politically and economically significant constituencies such as sport and commercial fishing interests and community stewardship groups; the fact that significant funding reductions might not be achieved quickly; and job loss, especially in some of the smaller communities in which hatcheries are located. Finally, there is the possibility that hatcheries might be transferred to other operators, who might operate them less professionally than DFO did. Some hatchery activities are recognized as "integral to delivering the Habitat and Enhancement Branch's full suite of programs"(Lill and Kent 2003).

Some of the lower-intervention (i.e., compared to hatcheries) enhancement programs improve access to natural habitat and in some cases create artificial habitat, both with generally positive impacts on conservation of habitat and of fish. Restoration projects also provide good examples of use of partnerships (e.g., with BC Hydro, community groups, local governments). They will become more important as part of legally mandated SARA recovery plan efforts. However, habitat programs represent only $2 million of SEP's current program costs and, like all program areas, may be subject to funding cuts (Innell 2004).

Programs have been re-organized. In 1995-96, the Habitat and Enhancement Branch (HEB) was created to consolidate SEP and habitat activities. More recently, there has been further consolidation, so that habitat and enhancement – as well as Oceans programs – are now within the same branch. SEP, habitat and fisheries management are now combined in what are described as "integrated area management organizations." The Department acknowledges that stewardship and community programs need to be integrated with other programs, hopefully through implementation of the regional Environmental Modernization Plan (Innell 2004). A goal of this integration was to do more with less. However, it appears that measures guided by this logic have already been taken beyond the point of diminishing returns.

Enhancement consists of a portfolio of activities, some of them helpful to, some of them harmful to the conservation of fish, habitat and fisheries. DFO's inability or unwillingness to reduce the harmful effects of enhancement from large-scale hatcheries and channels means that the record must be regarded as "mixed" – some success and some failure.

Looking forward, use of enhancement techniques and programs in support of legislatively required SARA and other recovery plans can be expected to bring a greater conservation emphasis to DFO's work in this area.

Core Challenges

This case study illustrates the following Core Challenges, as described in Section 5.2.

Inadequate Information

While DFO recognizes the need for additional research on wild-enhancement interactions, it does not allocate funding to conduct that research.

There appears to be "lack of long-term commitment to assessment and to integration of wild and hatchery data" (Gardner et al. 2004 p.108).

Political Influence

Hatchery operations that may be damaging wild stocks are kept in operation for a combination of political, economic, social and budgetary reasons. They account for a high proportion of DFO's enhancement budget – money that might be better spent on activities with greater conservation – and perhaps even production – benefits.

Budget Issues

While enhancement benefited from "surge funding" in the late 1990s, it now struggles to adjust to funding cutbacks and program consolidations (Lill and Kent 2003, Innell 2004).

Restoration activities can be classified as successes. However, they make up a relatively small part of DFO's overall enhancement budget. More could be achieved in this beneficial area if funding could be shifted out of the larger hatchery budget, much of the impact of which can be regarded as harmful to wild stocks.

Lack of Transparency and Accountability

If the precautionary principle were applied as it was meant to be applied, then hatcheries that are having adverse impacts on wild salmon would be closed or at least changes would be made to their operations.

DFO does not provide data on enhancement operations or impacts to the public in a meaningful or useful way.

Conflicting, Changing and Expanding Mandates and Direction

While SARA adds new responsibilities for enhancement activity, it is not clear whether funding provided will be adequate to carry out these new responsibilities.

5.3.11 Sea Cucumber

This case study deals with DFO's role in meeting its conservation mandate in actions related to the BC sea cucumber fishery.

It covers the species and fisheries objects of conservation, and relates to the science and assessment and fisheries management areas of responsibility. The time period is from the 1980s to the present.

The Story

The sea cucumber fishery began in the 1970s (DFO 2004a) and was one of the few dive fisheries to be placed under the constraints of an adaptive management approach in the early 1990s, using precautionary quotas. The fishery operates on a three-year cycle that leaves time to assess the impact of the fishery and how stocks are rebuilding.

There are many controls on the fishermen. The sea cucumber vessel master must: provide 24 hour notice before commencing fishing; confirm the remaining area and vessel quota prior to and during fishing; report harvest time and location before and after fishing and before landing catch; provide a daily harvest chart record of each location fished by each diver; participate in the industry-funded monitoring program; contribute to the in-season collection and compilation of harvest log data, collection of biological samples and year-end summary report of the fishery; provide at least 24 hours notice before moving to a new quota area and prior to delivery of sea urchins; have on board and maintain an approved catch Validation and Harvest Logbook which must be produced on request; provide and maintain an accurate record, a "log" including chart entries, of daily harvest operations; have all catch weighed and validated by a certified observer at the first point of landing; ensure that each area's catch is kept separate and that it is recorded on a separate log page; use designated landing ports; account for any weight of product lost during transport, or spoiled or wasted because of weather delays [applied to the vessel's individual quota and the applicable area quota]; and provide an accurate fish slip record of fish and shellfish landed for whatever use is required. The vessel master pays for dockside monitoring and a portion of research and management costs (DFO 2004b).

The current commercial quota is fished from approximately 25% to 30% of the coast (Campagna and Hand 2004, D&D 2004), with 50% of the coast closed permanently and 20% to 25% remaining available based on scientific biomass studies sponsored by the fishermen. Research areas are reserved for surveys, assessments and experimental harvests. Experimental harvests are determined annually and are in addition to the Total Allowable Catch established for the open commercial fishery areas. Closed areas provide protected areas for stocks and for First Nation and sport use. Based on biomass surveys in the closed areas and the use of conservative harvest rates, the quotas have more than doubled in the past three years and are continuing to grow.

The management of this fishery would have to be rated as a success. It has built-in conservation safety factors such as the facts that only a small part of the potential TAC is subject to harvest; the harvest is on a three year cycle; and the fishery is closely monitored and reported. The fishery also has a built-in research quota and program that provide funding to help better understand the stock dynamics, fishery impacts and the sea cucumber's ecosystem.

Note that the scope of this research does not include socio-economic impacts of quota fisheries – impacts which have been a serious concern to many interests in B.C.

Core Challenges

This case study illustrates ways in which DFO is rising to meet the following Core Challenges, as described in Section 5.2.

Inadequate Information

The research program is addressing the needs for information adequate to inform conservation-oriented management.

Lack of Transparency and Accountability

The Integrated Harvest Management Plan and a description of the fishery are on the DFO website (DFO 2004). Access to individual catch information is limited by privacy regulations.

Budget Issues

The fishery monitoring, research and general operations are paid for by the fishers, and the fees paid appear to be sufficient to support effective management.

External Relations and Shared Responsibilities

This is a co-managed fishery with fishers and other stakeholders involved in both management and research. The sea cucumber sectoral committee includes representatives from First Nations, recreational fisheries, non-consumptive users and MAFF, as well as DFO, the Pacific Sea Cucumber Harvesters Association, the sea cucumber service bureau and processors.

Weakness of Enforcement

Enforcement for the sea cucumber fishery works well. However, in all dive fisheries there have been concerns about illegal harvest of the very high value abalone that are offloaded and landed separately.

5.3.12 Freshwater Habitat

This section differs from the previous case studies in that it is a compilation of experience on freshwater habitat subject matter, and includes material from a number of past and current case studies, reports and analyses. The habitat topic is so diverse and complex that this research could not effectively represent it in one case study. In summary, DFO's track record for protecting habitat of fish and marine species has been weak – inadequate to achieve No Net Loss – for many years. There are indications that it is becoming weaker.

The law and regulations for protection of habitat are outlined in section 3. They include Fisheries Act provisions, most notably the 1986 No Net Loss Policy, critical habitat provisions of the Species at Risk Act, provisions of the Oceans Act such as those related to Marine Protected Areas, and provisions related to DFO's responsibilities under CEAA.

DFO is responsible for protecting all fish habitat, from freshwater through estuarine to marine. The focus of the following review is on DFO's responsibilities and performance in freshwater habitat conservation. Some of the main threats to freshwater habitat are: pollution, forestry, mining, gravel extraction, water use and urban development.

The provincial government is responsible for land and water use decision-making. Agreements have been entered into between the federal and provincial governments for coordinating and sharing responsibility for habitat protection activity. Until recently, the provincial government had participated with DFO in the referral process as a primary tool for conserving fish habitat. Now, the provincial government has experienced funding cutbacks and embarked on a program of so-called "smart regulation" or a "results-based approach" which leaves increasing responsibility to the proponents of development. The provincial government no longer participates in the referral process (West Coast Environmental Law 2004a and 2004b).

Previous Analyses of Habitat Conservation Issues

Over the past decade, a number of reports by DFO and external observers have analyzed various aspects of DFO Pacific Region's performance on habitat issues. In total, they illustrate that much is known about this subject area – but that there are numerous difficulties in the application of

that knowledge to achieve useful results. Some of the more important of these reports are briefly summarized here.

Quadra Planning Consultants. 1997. No Net Loss of Habitat: Assessing Achievement. Workshop Proceedings. This workshop was held in 1996, at a time when a national review of the National (No Net Loss) Habitat Policy was being planned. Convened by DFO, under the auspices of the Fraser River Action Plan, it brought together a number of people working in BC habitat protection at that time. The workshop concluded that "no net loss" objectives were not being met. Participants put forth a number of recommendations calling for: consistency of regulatory approach; watershed level planning that could address cumulative impacts on habitat; improved information; improved coordination with provincial and local authorities and refinement of legislation and regulations; improved communications, staffing and accountability, and improved internal coordination between DFO enforcement and assessment personnel.

Coast River Environmental Services. 1997. Urban Referral Evaluation: An Assessment of the Effectiveness of the Referral Process for Protecting Fish Habitat (1985 – 1995). This report evaluated the progress that had been made in implementing the urban referral process in the period 1985-1995. It noted that, while an effective federal-provincial-local theoretical framework had been put in place during the latter years of the analysis period, necessary partnerships with local government had not been put in place and, overall, compliance was still very poor.

Precision Identification Biological Consultants.1998. Wild, Threatened, Endangered and Lost Streams of the Lower Fraser Valley. This three-volume report assessed the condition of streams in the Lower Fraser Valley and provided an inventory that was intended to be used in future planning efforts. The information covered 98 streams, identifying impact factors both qualitatively and quantitatively. For the remaining salmon-bearing streams, the map and text information was to be used to help focus habitat restoration efforts.

Living Blueprint for B.C. Salmon Habitat. 1998. An independent panel of persons knowledgeable on habitat issues prepared this report. After assessing current and historic habitat protection efforts, it concluded that "governments are not acting in a way that will assure the continued high productivity of wild salmon stocks," and provided a series of recommendations for a "much-needed province-wide policy and strategy on habitat management, habitat protection, stream restoration and salmonid enhancement." Recommended federal and provincial actions were specified, noting that, while "federal government and the province have taken some positive initiatives in the recent past, much more needs to be done." There appears to have been limited follow-through on these recommendations, some of it during the CFAR-HCSP funding surge of the late 1990s. Some of the same recommendations were repeated in the 2004 Auditor-Generals' reports.

Dovetail Consulting.1999. An Evaluation of DFO Involvement in Land and Resource Management Planning (LRMP) in British Columbia. This report, prepared for DFO Pacific Region's Habitat and Enhancement Branch, evaluated DFO involvement in nine provincial LRMPs. It identified provincial-DFO issues in such areas as plan preparation, development and implementation, resource analysis and provincial/federal/stakeholder interactions. The report provided a series of recommendations for improvements in the process and alternatives to it that might be pursued.

G3 Consulting Ltd. 2000. No Net Loss of Fish Habitat: an Audit of Coastal Log Handling Facilities in British Columbia, 1994-1999. This audit report concluded that practices at log

handling facilities, many of which were in waters less than three metres deep, were resulting in negative environmental impacts on habitat. Inconsistencies in approach to regulation were identified between different areas of the province. It was recommended that existing guidelines and best management practices – of which there were many – should be better publicized, enforced and implemented.

Harper, D. J. and J.T. Quigley. 2000. No Net Loss of Fish Habitat: An Audit of Forest Road Crossings of Fish-Bearing Streams in British Columbia, 1996-1999. This audit report was conducted to determine whether habitat protection objectives were being achieved with regard to installation and deactivation of forest road crossings of fish-bearing streams. It assessed 46 stream crossings in the Prince George and Port McNeill Forest Districts and concluded that, based on results of these assessments, the potential for cumulative impacts to fish habitat, from the 3000 to 6000 stream crossings installed in BC annually, were high. It called for more strict enforcement by responsible federal and provincial agencies and for the consideration, wherever possible, of less impactful alternatives. It should be noted that this analysis was conducted before the implementation of the recently-enacted, results-based provincial Forest Management Code.

Werring, John and Doug Chapman. 2002. Law and Disorder. This report reviewed habitat legislation for BC's salmon streams. It concluded that "At the present time there is virtually no active enforcement policy in BC for Fisheries Act violations relating to improper logging practices." It noted that federal and provincial officials prefer cooperative regulation of the forest industry, rather than enforcement through prosecution under the Fisheries Act. The authors point out that this cooperative process runs the risk of creating "officially induced error," which limits the government's ability to enforce. The report recommended that a more progressive and precautionary watershed-based approach to habitat protection be adopted to protect remaining unlogged drainages to support all species of salmon.

Since this report was prepared, the province has implemented a regime for results-based forest and range practices, which has required that DFO re-examine its own involvement in the review process for forest development (Office of the Auditor-General of Canada 2004).

Commission for Environmental Cooperation. 2003. An investigation conducted in 2000 by Sierra Legal Defence Fund on behalf of a number of Canadian and American environmental groups found that DFO was unable to protect fish habitat on privately logged land on Vancouver Island by enforcing the provisions of the Fisheries Act. DFO cited lack of resources as the reason for the failure. The report of investigation findings was released by the Commission for Environmental Cooperation, a monitoring body set up under NAFTA.

Quigley, J.T., and D.J. Harper. 2003. Enhanced Delivery of Canada's Policy for the Management of Fish Habitat. This report assessed the performance of the Fraser Basin Council (FBC) in its activities that had been designed to complement and implement the DFO habitat protection policies and programs. The report concluded that, while some progress had been made, there was need for improved communications between DFO and FBC.

DFO. 2004. Habitat Assessment Branch. Completed Projects and Publications. This Web resource provides links to a number of pertinent studies and reports conducted during the 1997-2003 time period. http://www-heb.pac.dfo-mpo.gc.ca/assessment/completed_e.htm

Reports on Community and Local Government Habitat Stewardship

A series of reports issued between 1996 and 2004 trace the fate of community stewardship efforts related to fish habitat conservation during that time period. Beginning with optimism early in the period, the analyses document the pessimism and frustration that have accompanied recent funding cuts. These reports include:

Howard Paish and Associates. 1997. Stream Stewardship and Fish Advocacy. This report assessed the roles that community groups in the Lower Fraser region could play as advocates for urban habitat protection. It concluded that government officials, bureaucrats and politicians had unrealistically high expectations of these groups, of their organizational abilities, and of their abilities to contribute. (In many ways, it seems to have predicted the unfavourable outcomes documented in 2004 by Harvey and Greer.). The report provided recommendations for the most cost-effective means for DFO to support such groups.

Rosenau, M. and M. Angelo. 2001. The role of public groups in protecting and restoring freshwater habitats in British Columbia, with special emphasis on urban streams. PFRCC Advisory Report. This report noted that, with declines in DFO funding, the role of public stewardship groups would become increasingly critical in habitat protection. It called for the development of more effective partnerships in this regard.

Harvey, Brian and D. Greer. 2004. Reality Stewardship. This recent report documented the manner in which community stewardship efforts, including those related to habitat protection, had become weakened in recent years. It criticized DFO for having over-estimated the abilities of these groups to contribute and for having provided insufficient direction and funding to many such efforts. It predicted that the requirements of the new Species at Risk Act (which includes provisions relating to preservation of critical habitat) would change the nature of community stewardship.

Recent Auditor-General Reports

Two reports issued in October 2004, one from the federal Office of the Auditor-General, and one from the BC provincial Auditor-General, provide current and thorough analyses of federal and provincial, and their combined, performance on habitat issues.

Federal – Office of the Auditor-General of Canada. 2004

The 2004 federal Auditor-General's report noted that "Fisheries and Oceans Canada has never reported on the status of fish habitat conservation in Canada or assessed the effectiveness of its Habitat Policy (p. ii).

It identified (p. 1) the following gaps in managing risks related to habitat protection:

- Inability to finalize the Wild Salmon Policy (which contains habitat protection provisions);
- Shortcomings in information;
- Weaknesses in regulatory approvals, enforcement and monitoring; and
- Inadequate coordination between federal and provincial governments.

The report noted that many of these same concerns had been raised in previous Auditor-General's reports dating back to 1997, but that little progress had been made by DFO in implementing the recommendations of these reports.

Provincial – British Columbia. Office of the Auditor-General. 2004.

The 2004 report of the provincial Auditor-General concluded that "the administration of activities that impact wild salmon habitat falls under a variety of provincial statutes, which are managed by various ministries and agencies that often have different, and sometimes competing, priorities."

The report analyzed six pieces of provincial legislation, administered by three ministries that affect six areas of habitat protection, restoration and management, noting the strengths and weaknesses of each. It noted that other pertinent legislation was being prepared (as, for example, in the area of agricultural impacts.)

The report pointed out that "the new results-based regime now requires the private sector to share more direct responsibility for habitat protection and stewardship functions by taking on some of the planning, information collection and monitoring activities previously performed by government agencies. The authors expressed their concerns that:

> "this new approach may increase the risk to fish habitat since it eliminates many of the previously required planning and due diligence requirements undertaken by government agencies." (British Columbia Office of the Auditor-General 2004)

UBC Forestry professor Dan Moore has described some of the measurement difficulties likely to be encountered in analyzing the effects of a results-based forest practices regime on riparian habitat (Moore 2002).

New Initiatives at the Federal Level

Organizationally, responsibilities for Oceans and Habitat have recently been combined. This seems to be a response to budget reductions, rather than to any commonality between the two areas of responsibility.

The department has recently begun to implement the "Environmental Process Modernization Plan" (EPMP) at both national and regional levels. Although still in the development phase, it is intended to apply improved risk management principles to habitat protection (DFO 2004a, 2004b, 2004d, and 2004e). The Plan has five elements:

- Risk Management Framework
- Streamlining Practices
- Improving Coherence and Predictability
- New Management Model for Environmental Assessments and Major Projects
- Renewed Emphasis on Partnerships

According to the Minister, "the EPMP will provide greater effectiveness and efficiency in administering our regulatory responsibilities for fish habitat and is consistent with the Government of Canada's Smart Regulations agenda. (The plan will) reorient delivery of the Habitat Management Program from routine, low risk activities… to those posing the greatest risk" (DFO 2004e).

As part of the Plan's emphasis on partnerships, DFO has executed an agreement for cooperation with seven natural resource industry associations, in which they agree to collaborate in conserving and protecting fish habitat. The cooperating associations are: Canadian Association of Petroleum Producers, Canadian Electricity Association, Canadian Energy Pipeline

Association, Canadian Gas Association, Forest Products Association of Canada, Mining Association of Canada, and the Prospectors and Developers Association of Canada (DFO 2004c).

New Initiative at the Provincial Level

The new Riparian Areas Regulation, which comes into effect in March 2005, is provincial legislation. However, DFO has cooperated in the development of the regulation. Some analysts question whether DFO has inappropriately delegated some or all of its Fisheries Act responsibilities to the provincial government in the case of this regulation.

The current Streamside Protection Regulation ("SPR"), passed in 2001, requires pre-determined minimum setbacks of up to 30 metres for new development. Developers have felt that such a "one size fits all" approach is unduly restrictive. The new Riparian Area Regulation ("RAR") would provide greater flexibility, addressing the specific setback needs of each streamside area, and treating the 30 metre setback as a maximum that could be reduced based on the results of private studies. Details of the new regulation have been provided by BC WLAP (BC Water Land and Air Protection 2004).

West Coast Environmental Law has criticized the new regulation on a number of points. It suggests that the new regulation would significantly weaken the old. It questions whether anything more than an assessment by "qualified environmental professionals" is required – in other words, it questions whether any regulations adopted have to incorporate the findings of the assessment. It further questions whether DFO may have inappropriately delegated authority to the province to enforce the Fisheries Act provisions regarding habitat (West Coast Environmental Law 2004b, 2004c).

The Habitat Protection Workload: Staff, Workload and Budget Issues

The core resources available to DFO to carry out its habitat protection responsibilities have been steadily shrinking over the years. Therefore, it has been necessary to implement selective enforcement policies and to attempt to share the burden of enforcement with the provincial and lower levels of government.

The Oceans, Habitat and Enhancement Branch, like the rest of Pacific Region, is faced with the need to cut staff and budget, in line with department-wide targets. These targets for the current year could range between 30 and 40%.

Although the specific details of cuts are not known at this time, here are some of the possible consequences for habitat protection in the Region.

- Weakened ability to support the habitat components of SARA-mandated recovery plans and of the new Wild Salmon Policy. This weakness may be particularly apparent in the Lower Fraser region, where high habitat impacts and numerous stocks under pressure and threat, combine. It may lead to severe fisheries conservation measures, if other means of protecting stocks are not available.
- Delays in conducting CEAA and Section 35 reviews of aquaculture applications. It is possible that funding might be secured from the provincial government, industry and/or DFO national office to perform this work – which of course raises conflict of interest and independence issues.
- Inability to deal with expanded Yukon workload, as previously federal responsibilities (DFO and non-DFO) are devolved to the – reportedly pro-development – territorial government.

- Reluctance to carry out activities related to enforcement, especially on those files that might require large time commitments related to charges brought against offenders. This may also affect the effectiveness of enforcement (C&P) personnel, if habitat staff are no longer able to provide them support as they have in the past.
- Reduced "soft time" with stakeholders and project proponents, building rapport and understanding of habitat protection requirements, engaging in watershed-level and other proactive cooperative endeavours.
- Continued neglect of distant and isolated areas of the Region.

Budget cuts may be affected by terminating staff. Management has to choose between laying off a few highly knowledgeable and experienced, but highly paid staff, and the alternative of laying off many more inexperienced, but lower paid staff. Terminating any experienced staff could have the least impact on meeting bureaucratic workloads, but could result in more questionable technical outputs and lapses in continuity of direction. Termination of inexperienced staff would have less impact on program delivery, but at a cost of possible inability to meet bureaucratic workloads in a timely manner.

Summary of Key Issues

Together, the numerous reviews and studies conducted over the past decade conclude that conservation of habitat has been poor. The number, extent and distribution of developments that impact fish habitat have increased markedly since the 1980s, as has the diversity of habitat impacts (e.g., related to more and more chemical pollutants and products of different types). In particular, habitat losses in the Georgia Basin area have been widespread. The urban development in the Lower Fraser region and around the Georgia Strait has resulted in loss of almost all minor streams and adversely impacted many larger streams and rivers.

Damage from forest harvesting, transportation systems, agriculture and water use is widespread. Forest harvesting is moving into previously unlogged areas of the Central Coast and northern interior. Currently there are insufficient resources available in DFO to monitor harvesting activity. Monitoring of forestry activity has not been a DFO priority for at least the last five years.

At the same time, climate change and resultant high water temperatures and altered water flows have been having increasingly adverse impacts on salmon stocks, in particular in southern BC and the Fraser system. Climate change often multiplies the effects of other habitat factors to create unsustainable cumulative effects.

The pro-development objectives of the provincial and local governments, especially in recent years, are opposed to the conservation mandates of DFO. BC agencies continue to licence land, water and other natural resource use with limited consideration for impacts on fish production. DFO often appears reluctant or unable to enforce its regulations, and leaves enforcement to other levels of government. Yet the enforcement capabilities of provincial ministries such as WLAP are being steadily and significantly reduced, especially over the past three years, as the province moves to increasing self-regulation by industry (West Coast Environmental Law 2004a).

DFO Pacific Region lacks staff and budget resources to carry out effective enforcement of habitat laws and regulations (see section 4). Added responsibilities in the aquaculture area include significant habitat-related assessment and monitoring work, further stressing limited capacity for habitat conservation. Thus, DFO personnel continue to be in a reactive mode, able to

deal with impacts only after they have occurred – and then in only a limited way. Many of the losses to urban and industrial development are irreversible and not compensated for. The lack of monitoring and research means that losses could be much higher than those which have been documented.

There are a few positive signs, such as changes in water management regimes, SEP restoration and community programs. SEP habitat restoration work has resulted in sustaining some populations and habitat capacity, but these efforts have not kept pace with habitat loss in many areas.

The ever-decreasing habitat protection program is setting the direction for the future, with those who impact habitat increasingly able to ignore protection requirements. If and when the direction of the program is reversed and strengthened, it is reasonable to expect a long and costly rebuilding period.

6 CONCLUSIONS

This section provides an overall assessment of DFO's performance on its conservation mandate, organized with reference to the eight core challenges identified in Section 5.2. The assessment draws from the review and analysis of pertinent literature and case studies, as well as from information provided by the Delphi participants. For each of the core challenges, we identify both positive and negative aspects of DFO Pacific Region's conservation performance. While the challenges are addressed individually below, it must be recognized that they also interact with one another to create a general environment of dysfunction. Problem interactions influence the choice of solutions and remedies.

DFO has inadequate information to carry out its conservation-related responsibilities. More is required of the Department in this regard as its responsibilities expand, but performance is falling short.

DFO does not conduct its operations in a transparent manner, and does not provide enough meaningful and timely information on its conservation performance to its various audiences.

DFO does not have 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.

6.1 Inadequate Information

On the positive side, fishery related co-management relationships and data requirements associated with some fisheries have increased the amount, consistency and relevance of data collected. For example, in salmonid enhancement programs (see enhancement case study), marking and monitoring of stocks is key to providing management information. A number of enhanced stocks are used as index stocks that provide essential information for overall conservation. The sablefish quota fishery (see sablefish case study) also illustrates the benefits of government-private partnering for improved information, as an aid to fisheries conservation. Some public involvement activities and collaborative efforts (see Okanagan First Nation – Skaha Lake case study) have also provided information important to the management of fisheries and/or habitat.

On the negative side, stock assessment capability in the region has been continually eroded, with monitoring and sampling often limited to a few indicator stocks. In many fisheries, stock

assessment information is of limited or little use in making decisions regarding conservation or harvest of a given stock. In some cases, indicators are lacking; in others they are not useful or meaningful. The Groundfish and Rivers Inlet case studies illustrate these points. The existence of many mixed stock fisheries complicates the stock assessment process used to manage individual stocks and requires more in-depth and extensive information for successful management. The Rivers Inlet and Cultus/Sakinaw case studies illustrate this situation.

Weaknesses in stock assessment have put, or may soon put, Canada in violation of international treaty agreements (e.g., in connection with salmon monitoring). Not only is effective assessment required by international agreements to which Canada is a party, it also provides the intelligence that can and should be used to inform and drive fisheries management and conservation decisions.

Recent Pacific Region budget cuts have been made reactively, without sufficient consideration of the priority that should be accorded to stock assessment activity.

The sablefish and aquaculture case studies provided two examples of DFO acquiescence in provincial approvals of aquaculture operations, apparently without adequate information about impacts on wild stocks.

In the case studies dealing with sea lice/salmon aquaculture research and research on impacts of enhanced fish on wild fish, it is not clear whether the absence of needed information was the result of inadequate funding, misplaced research priorities, or perhaps a decision to ignore a research area, the findings from which might lead to federal/provincial conflict or public embarrassment.

Finally, much of the existing DFO information is difficult for the public to access, and the data is being considered private property in some fisheries.

Transparency and Accountability

On the positive side, co-management arrangements increase transparency, at least with those directly involved. The sablefish and sea cucumber fishery case studies provide examples of transparent and open management. (There are, however, many critics of quota fisheries who believe these fisheries have had negative social and economic impacts on those who have not benefited as licence holders. This debate is beyond the conservation focus of this report.)

In general, the DFO website makes information available, but not easy to access. Also, some of the information is often more promotional than factual.

Since its creation in 1998, PFRCC has increased transparency and accountability. However, recent budget cutbacks imposed on the Council may weaken its ability to continue its work. The Pacific Scientific Review Advisory Committee (PSARC) process has brought new rigor and standards to conservation. However, at times PSARC advice and the precautionary principle have been ignored (see the coho case study) when information is not certain.

On the negative side, the Region's information systems are not able to track DFO fishery management costs against individual fisheries, even as commercial fishermen are being asked to share management costs with DFO.

DFO budgets are accounted by organizational unit and project, not by species, area, or ecosystem.

Policies and, in cases such as habitat loss, guidelines provide few readily available indicators that would help members of the public to identify where or how these policies or guidelines are being met.

DFO misinterprets and waters down the implementation of international agreements that are intended to further conservation. In particular, some of the case studies (groundfish, Georgia Strait coho, and salmonid enhancement) provide examples of DFO misapplying the precautionary principle, keeping fisheries and hatcheries open in spite of evidence of possible conservation harm.

Staff have been forced into a kind of " triage" (urgency-driven priority sorting) on stocks and habitat because of budget cuts and lack of information. While this decision process reduces management complexity and government costs, it is invisible, with no formal records of decisions, no monitoring of impacts and no accountability. Lack of information on stocks or habitat makes it easier to ignore possible threats to them and thus to reduce stresses on management and budget.

There is no public accountability for fisheries conservation. The DFO Minister has an obligation to report to Parliament on some habitat protection issues but not on stock status and conservation. Even the required reporting often appears years after the fact. As well, there is no public consultation on habitat protection agreements with industry.

6.3 Budget Issues

On the positive side, user-pay arrangements have increased funding for enforcement and monitoring. They have also provided a process for accountability for spending of both users and relevant DFO budgets. The sablefish and sea cucumber case studies provide positive examples of such arrangements.

In recent years, public involvement has been successful in bringing in non-government resources. For example, the Pacific Salmon Endowment Fund (PSEF) provides a quasi-independent funding source. More recently, however, public involvement has been dramatically reduced by a variety of budget cuts.

On the negative side, the level of funding for conservation programs has been shrinking for at least a decade, with continuing reductions in prospect. It seems to be generally agreed that the DFO Pacific Region budget is insufficient to carry out the activities required under its conservation mandate. Recent budget cuts have compromised basic conservation activities, while funding continues for such activities as aquaculture. Case studies in which insufficient budget has contributed to inadequate performance include groundfish, Rivers Inlet/Smith Inlet, designation of marine protected areas and West Coast Vancouver Island Aquatic Management Board.

Decreased budgets have forced operational staff to make conservation triage decisions that have effectively left many stocks and habitats with no protection, no monitoring and a questionable future. Surges of funding have made program expansion possible; their withdrawal has required that programs be severely limited or shut down. Special purpose funding directed to specific uses has often redirected staff and other resources from core activities. There is inadequate funding to address complex ecosystem, fisheries and habitat management issues.

6.4 Political Influence

On the positive side, in some cases, like intervention to achieve improved conservation of stocks in fisheries and to implement the Pacific Salmon Treaty, Ministerial intervention has been constructive in terms of conservation aims.

On the negative side, politically motivated decisions have harmed conservation. A number of case studies describe instances of political interference with conservation-related activity, including those dealing with enhancement and hatcheries, salmon aquaculture and sea lice, sablefish aquaculture, Cultus/Sakinaw sockeye and Georgia Strait coho. The marine protected areas case study highlights the related issue of lack of support from DFO headquarters in Ottawa, even in cases where regional employees recognize the need to take actions towards conservation ends.

Overuse of ministerial discretion handicaps efforts toward solutions in such areas as fisheries co-management. Those who argue for long-term predictability as an incentive toward investment in a given fishery point to the short duration of public-private agreements (usually one year) as one of the problems related to ministerial discretion.

Political decisions to transfer development related assessment, authorization and monitoring costs to the fisheries resource are not acceptable unless government provides funds to at least partly recover those costs directly.

6.5 External Relations and Shared Responsibility

On the positive side, co-ordination of multi-agency involvement is one of the strengths of the new Species at Risk Act – at least on paper. Implementation of SARA is intended to bring the full force of government – including DFO – to bear on the conservation of stocks. However, application of SARA to specific endangered stocks is not automatic.

Also on the positive side, multi-agency processes such as the federal/provincial land use planning process, and to some extent, marine protected area planning, provide funding for conservation and public involvement, helping to plan and prioritize land and coastal zone uses to conserve key areas. Co-management, effectively implemented, can create positive external relationships. Community groups are a strong voice for local conservation. The Okanagan First Nation – Skaha Lake case study provides an example of effective multi-agency partnering to achieve common objectives.

The Pacific Salmon Treaty helps to manage the complexity of mixed stock and intercepting fisheries in Canada and the U.S.

On the negative side, there are instances where the interpretation of the law by other federal agencies may differ from that of DFO, making implementation of actions to achieve DFO's conservation mandate more difficult. One example is the enforcement of the pollution provisions of the Fisheries Act (Section 36) by Environment Canada, rather than DFO. Also, as in the Sablefish, Rivers Inlet, Cultus/Sakinaw and Salmon Aquaculture case studies, DFO has often deferred to the provincial government, municipalities and industry on habitat protection and wild stock preservation issues; DFO is thus letting economics win over conservation.

In the case of marine protected area designation, difficulties in reaching agreement with the province and with First Nations have been a major impediment to progress.

Most federal/provincial agreements to date have not significantly affected the way either party conducts business. Token agreements for the media do not address conservation problems. To be effective, such agreements must actually change the way business is done.

6.6 Bureaucratic Complexity

On the positive side, co-management simplifies management and brings together key interests for common understanding and to work out compromises. The mandatory provision of data helps to address complexity.

Decentralization of DFO offices to the same centres as provincial offices should help to coordinate between the two levels of government, especially on habitat conservation.

Recently established federal-provincial institutions such as the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) and the Pacific Council of Fisheries and Aquaculture Ministers (PCFAM) have had a moderating effect, providing a way for regional concerns and priorities to rank higher in the federal-regional balance.

On the negative side, DFO is part of a universe of partially responsible government institutions. The conservation bureaucracy consists of multiple, loosely coordinated agencies, each with a mandate that could contribute to conservation, but lacking a way to come together to do the job. The civil service is structured in a way that leads functionally oriented departments and programs to compete for resources and power. This gives them an incentive not to cooperate; they can blame others when things fail and use problems to enhance their case for more resources.

Some decentralization efforts may have to be abandoned because of resource shortages.

DFO Pacific Region is charged with dealing with a complex and rapidly changing array of responsibilities. Management of individual fisheries has grown more complex with each passing year. Organizational structure and staffing should therefore reflect that increasing complexity. However, the levels of staffing, responsibilities and qualifications of the personnel may not be up to the task.

Complex issues such as mixed stock fisheries, diverse habitat impacts and changing global and ocean climates require – but are not getting – sophisticated and competent management.

There are still a number of instances where national needs and priorities – political, economic, and budgetary – take precedence over regional conservation concerns. The aquaculture case study provides an example of this.

6.7 Conflicting, Changing and Expanding Mandates and Direction

On the positive side, Pacific Salmon Treaty arrangements and co-management agreements provide examples of clearly stated structures which help to achieve performance on the conservation mandate. Also, as the salmonid enhancement case study demonstrated, the Species at Risk Act may add responsibilities for use of enhancement as part of species recovery efforts.

There is some doubt, though, about whether adequate funding will be provided to carry out these new responsibilities.

On the negative side, added funding does not in all cases accompany added mandates, requiring administrators at the regional level to address the new mandate(s) in only token ways, often by thinning out the ranks of staff devoted to other pre-existing programs. For example, when the Oceans Act was passed, no new budget was allocated to its implementation.

Furthermore, while new legislation may call for more effective conservation practices, sometimes it is proving difficult to change from the old ways to the new – as was illustrated in the Cultus/Sakinaw case study (adoption of the ecosystem approach only when SARA required it) and the groundfish case study (difficulties encountered in shifting from Integrated Fisheries Management Plans to new approaches required by the Oceans Act.).

Problems are also caused by secondary consequences of changes in mandates or operating practices. For example, the Coast Guard requirement to do search and rescue activity and border security activity detracts from fisheries enforcement and monitoring work.

Conflicting objectives and mandates may undercut the resolve of employees to implement the conservation mandates. Economic development and international trade considerations may be viewed as more important than conservation.

6.8 Weakness of Enforcement

On the positive side, co-management and user-pay enforcement have improved the consistency and coverage of enforcement in some cases. The Sablefish case study illustrates this point. Also, court decisions that required DFO to expand habitat preservation activity into fisheries other than salmon have given those areas better protection.

On the negative side, there are difficulties associated with enforcement through the criminal law system. DFO staff often hesitate to press criminal charges, knowing the likelihood of prosecution is weak. Lack of properly funded, trained and located staff has led to a "selective or targeted enforcement" approach. Violators, aware of this attitude, become more willing to take risks. In the Cultus/Sakinaw case study, for example, it was noted that illegal fishing and poaching may have had a significant effect on both stocks.

Shared enforcement responsibility with provincial and other levels of government creates situations in which federal challenges to provincially approved activity are viewed as politically inappropriate or embarrassing. This problem was illustrated in the Salmon Aquaculture, Cultus/Sakinaw and Freshwater Habitat case studies. Political interference with enforcement decisions, or political direction to not enforce, undercuts staff's ability and willingness to carry out their enforcement duties. This point was illustrated in the groundfish case study.

7 POTENTIAL SOLUTIONS

This section presents initial ideas for some potential solutions to the problems and challenges identified in the analysis of the case studies and in previous analyses. The potential solutions are presented with reference to the three objects of conservation: species, habitat/ecosystems and fisheries. In addition, we suggest some potential solutions related to process and reporting, and solutions related to budgeting for conservation.

It is the Minister of Fisheries and Oceans' prerogative to set priorities in decisions about whether and how much to conserve fish stocks, their habitats, and fisheries. Budget, staffing and timing limitations can make this into a "triage" decision-making process, in which some actions may not be taken in extreme situations because the cost is high and the likelihood of success is low. The Minister is accountable to Parliament for those decisions, but the impacts of such decisions rarely make it to Parliament for consideration. However, as many people in B.C. rely on access to these resources for income, employment, recreation, subsistence and cultural uses, and place high "existence value" on fish stocks, the Minister should report and be accountable for those triage decisions to the public. Some of the following potential solutions relate to this decision-making, reporting and accountability.

7.1 Conservation of Species, Stocks and Populations

Manage at the individual population level until genetic stocks are properly identified

Conserving fish resources requires the conservation of the genetic diversity within and between the various fish stocks. As the capability to measure genetic differences has increased, the genetic differences between individual populations have become increasingly apparent. For salmon, pending actual sampling of genetics between populations for at least two cycles[3], it is best to assume that each population is a separate stock, certainly for sockeye, chum, Chinook; less so for pinks and coho. In the context of the Wild Salmon Policy, the definition of conservation units is critical. If the units are too large, many different stocks can be pooled and managed together. This would result in continued erosion of weaker stocks and ultimately their loss as genetic entities. If the conservation units are too small, it will be complicated and expensive to sample and manage for many individual units.

For salmon, it is safest to operate on the assumption that every population is a separate stock until acceptable genetic screening methods prove it to be the same as other local populations. This would conserve the genetic diversity and provide a strong economic incentive to do the required genetic sampling in order to safely pool related populations for cheaper and easier fisheries and habitat management.

[3] For example, Fraser sockeye salmon are mainly four years old, which means that the fish returning in year 1 may be different from those in years 2, 3, and 4. As sockeye have a 4 year cycle it is important to sample each of the cycle years. Ideally, sampling would be over 8 years so that each cycle year is sampled at least twice to determine if there is any change through time.

Apply the precautionary principle appropriately

DFO Pacific Region should apply the precautionary principle as intended in its original form, as represented in international agreements. For fish stocks with limited or weak information, Total Allowable Catch (TAC) should be set proportionately low and habitat protection requirements set high. For fisheries on stocks that are subject to habitat development impacts, especially those with limited information about cumulative development impacts, the TAC should be set conservatively. At the same time, measures to reduce or eliminate those development impacts should be taken to shift the burden of the cost of conservation to those causing habitat degradation and away from fishermen and taxpayers. For example, base fines must exceed the cost of prosecuting the case; HADD authorizations should have significant fees related to the extent and intensity of impacted habitat.

Develop, apply and publicize quantified goals and performance measures

Quantified goals and performance measures should be required for each stock – including stock rebuilding and information timelines and specific targets. This information should be easily available to the public in digital format. Performance in reaching these goals and measures should be reported on annually as part of the planning process. When goals are not met there should be an accountability process to determine the reasons for failure. DFO should be publicly accountable for its conservation of fish stocks.

There should be an audit process to ensure that the various groups involved are meeting agreed conservation performance standards and targets. The audit should be conducted by a body independent of DFO and interest groups, possibly associated with the Auditor-General's Office. The federal Auditor-General's Office should consider assigning permanent auditing personnel in the Pacific Region to monitor DFO performance.

Use a zone system to guide the application of conservation responses

For each fish stock there should be clearly defined zones of stock abundance and thresholds at which prescribed management actions are triggered. At one extreme there should be a *preservation zone* of stock abundance and/or rate of stock decline at which all possible actions are invoked. This is equivalent to a SARA at-risk rating and the draft Wild Salmon Policy limit reference point (DFO 2000). At the other extreme, there should be a *sustained production zone* of stock abundance, for conservation of fisheries – the target reference point in the draft Wild Salmon Policy. This should be the target for all management actions. Between these two extremes, there should be a *conservation zone* of abundance. That zone would represent a range of abundances over which a graded conservation response would be implemented.

The further the stock is from the production zone the more stringent and comprehensive the prescribed response. The responses triggered should be reduced TAC in the fishery, no increased impact on habitats, a review and report (scientific and public) on the causes of the decline, and studies to answer any outstanding questions. Reduced TAC and habitat impacts should stay in effect until the studies are completed, issues are resolved, and stocks have been replenished

The types of changes that should trigger a conservation response include likely changes in: stock abundance and abundance trends; habitat productive capacity resulting from ocean productivity, climate factors, or development impacts in key habitats in the life cycle (e.g. for salmon in freshwater, estuary, and coastal migration route); and changes in fisheries (location, time, gear,

harvest rates, etc). First Nations, communities, fisheries and environmental groups and DFO should be able to trigger some level of conservation review.

7.2 Conservation of Habitat/Ecosystems

Salmon and freshwater fish face significant habitat protection challenges from human impacts. There are also important habitat related conservation problems in estuarine and coastal areas for herring, shellfish, and juvenile fish of many species.

Acknowledge that the present habitat conservation system is not working properly

Without the current habitat conservation processes, much more habitat capacity would have been lost. However, those processes are not working adequately and there is still a significant net loss of habitat capacity. The first step is admitting that we have a habitat problem. DFO and the provincial government should acknowledge that the current habitat conservation/protection strategy is resulting in widespread and, in many cases, permanent loss of fish habitat. Budget cutbacks have led to increases in the rate and extent of habitat loss. In practice, habitat fish productive capacity is traded off in favor of economic development benefits; developers and local governments profit while fish harvesters bear the costs. There is no balance. Habitat development guidelines and requirements minimize loss of habitat productive capacity and do not achieve 'no net loss'. Although some individual developments may not have a significant impact on habitat fish productive capacity, their cumulative impacts are at least additive and in some cases multiplicative. Continuing changes in climate and weather extremes often severely aggravate these impacts. Unless such losses are compensated for, fish productive capacity and fish production will continue to be lost, in many cases forever.

Implement a new habitat conservation strategy

A new habitat conservation strategy is needed to deliver upon the 1986 DFO Habitat Policy to assure an overall net gain of habitat and no net loss of all existing habitats. Conservation of habitat must be a first priority. There is a great concern that DFO's present attempts to modernize habitat protection delivery by stressing self compliance and reduced project reviews appear to expose the resource to a high risk of greater losses. This conservation strategy should include DFO and the provincial government, both actively participating in more proactive land use planning to totally protect key areas and set standards for others. It should also include other responsible federal agencies and departments, such as Environment Canada and the Canadian Wildlife Service. Developers should be required to meet protection and monitoring needs. There should be visible and active enforcement, using an array of public accountability, administrative and criminal law tools. The current focus on referrals and bureaucratic process should be reduced to the minimum required for effective enforcement, in lieu of these more rigorous and transparent enforcement tools.

In areas where fish are not given land use planning priority use status (assuming that they cannot have top priority in all areas), developers should be required to compensate for their impacts on productive capacity by a mix of prevention and compensation to achieve no net loss. In areas where best management practices have been implemented and circumstances still do not permit healthy wild fish populations to be sustained naturally (e.g. urban and industrial areas), fish production should be supplemented or enhanced as necessary. The target level of enhanced

production must be compatible with management of stocks and mixed stock fisheries so as to stay within limits that do not pose risks to wild salmon populations outside of the watershed.

A new, proactive strategy will require more dedicated funding from the different levels of government and/or private sources. It will also require experienced staff or contract resources to evaluate data and carry out essential enforcement tasks.

Develop a formula for equitable sharing of habitat protection costs related to the salmon fishery

Implementing salmon fishing management plans should help in conserving the fisheries through fixed catch limits and improved stock assessment information, and "user-pay" systems ultimately may be able to cover fishery related costs. However, fishermen should not be obliged to cover all salmon habitat protection costs. As it is government that is approving these habitat developments, and it is developers that are the main direct beneficiaries, either the approving agency or the developer should be paying these costs. Under new licensing arrangements, fishermen should be able to protect their fisheries interests by suing developers and/or government for demonstrable losses of production.

Reduce bureaucratic complexity

Another important step could be to reduce the extreme bureaucratic complexity in the habitat protection process, which now includes, in addition to DFO and the provincial government, responsibilities for CEAA, NWPA, SARA, responding to Access to Information and Privacy (ATIP) requests and referral and enforcement procedures.

DFO should work with the provincial government to convert the DFO (and BC) habitat protection policy into a policy framework that is useful for guiding field applications. The overall goal might still be to strive for no net loss of habitat capacity to produce fish. However, for the next level of overall direction, DFO should be an active participant in land use planning processes that bring together the diverse issues and interests in a common forum to work out mutually acceptable solutions and tradeoffs for setting priority uses of each geographic area.

Use a zoning system to distinguish between different types of habitats and impacts

All fish habitats have value and can be harmed by development or watershed change. The principles of conservation first and the precautionary approach must be the foundation of a protection plan. Zoning waterways to reflect their productivity and/or sensitivity and associating that with development guidelines has worked well in many jurisdictions (e.g., the Fraser River Estuary Management Program (FREMP) – the red, yellow, green zoning system). Such a system would deliver on the intent of the Fisheries Act and the needs of the National Habitat Policy. Habitats that are highly productive must receive a very high level of protection, i.e., no impact. Habitats that are more resilient and are of a lower productivity can be subject to development and compensation. Areas that are of low productivity can allow development with good practices to mitigate and prevent impacts. Such an approach will lower project referral workloads but, as with all approaches, must be closely monitored and evaluated, and enforcement must be obvious. These latter follow-up approaches have not been given adequate priority in DFO.

Apply the precautionary principle appropriately

Within that policy framework the precautionary principle should be applied as it was intended to be applied in international agreements. The burden of proof should be on the proponent of a project to prove that an area is not habitat, rather than the reverse. For development in areas where information about the habitats, stocks, and/or the type of development is limited, proportionately conservative limits should be placed on the development impacts and risks. As well, increased requirements for monitoring and information analysis should be imposed.

Develop, apply and publicize quantified goals and performance measures

Quantified performance measures with specific targets and timelines should be required to monitor habitat productive capacity and protect it against adverse impacts. Performance should be reported biennially, as part of a review and planning process. When goals are not met there should be an accountability process to determine the reasons for failure. DFO should be publicly accountable for its conservation of fish habitat capacity.

Increase information required from developers impacting habitat; move toward a user-pay approach

Habitat developers (including aquaculture) and agencies approving developments should have to meet basic information requirements comparable to those placed on commercial quota fishermen: third party reporting of quantified impacts on the fish; recording all activities having to do with fishing; third party analysis of data; and funding of basic research related to priority unknowns. This would transfer habitat protection and monitoring costs to the developer, who could work them into their development and operations. As with fishing, this would provide a basis for enforcement, administrative sanctions and ultimately enforcement under criminal law. It would also put habitat protection monitoring and enforcement on a user-pay basis. Third party enforcement with clear controls and disincentives for illegal activities would be a step forward. Combining a meaningful ticketing system with the criminal provisions of the Fisheries Act would significantly improve the effectiveness of the present system.

The quality of information provided would be improved if developers were required to rely on DFO-certified habitat assessment and protection professionals to review developments, design protection works and monitor construction. Such an out-of-service program will require good design. Performance should be closely monitored, using enforceable performance conditions that are part of the certification process.

Require meaningful ecosystem monitoring information

Development licenses, approvals or agreements should include a requirement to provide meaningful ecosystem monitoring information. The requirements should also include detailed pre-development baseline monitoring and documentation, ideally conducted by an acceptable third party. Habitat development permits should include clauses specifying that habitat protection, monitoring and restoration requirements could increase as a result of other development in the area, climate change and/or new information. Development agreements should be multi-year, should specify penalties for failure to meet agreed requirements, and should be available to the public. This would clear the way for more effective administrative sanctions and criminal enforcement.

To make a smaller civil service work effectively in both DFO and the Province, legally certified environmental professionals are required. If such professionals do not protect habitat properly, they would lose their certification. A legal agreement with BC and the professional associations on basic qualifications and an enforceable code of conduct would be required.

Implement a formal audit process for self-enforcing and self-monitoring industries

Now that government has committed to have industries be responsible for self compliance regarding habitat protection, a formal audit process is essential to ensure compliance with development agreements/permits. This process should include a schedule of targets related to maintaining or increasing habitat fish productive capacity, and indicators showing progress being made toward meeting these targets. This audit function should be independent of the agencies that approved the development. It could include established watershed protection groups.

Require development cleanup bonds for certain types of developments

Developments like logging that can have long-term impacts on habitat, even when the development is terminated, should be required to provide an appropriate financial bond before getting a final development permit or authorization. For example, some mines require long-term treatment of effluents after they stop operating. In the absence of bonds, if the owner declares bankruptcy such cleanup and treatment are left undone or as a government cost.

Rationalize the application of charges and penalties

There is a clear requirement to rationalize habitat related charges and penalties. Prosecutions in connection with damage to habitat should not focus on those causing minor habitat impacts while ignoring or sanctioning those who cause major impacts. There should be a transparent, active and consistent enforcement program.

Implement integrated planning into Marine Protected Areas

In terms of ocean habitat conservation, marine protected areas and integrated management are currently among the most promising tools available to DFO. The three pilot MPAs that have not yet been designated should be officially established so as to set examples for additional MPAs, and actions to promote the nomination and establishment of additional MPAs should be taken. The sponge reefs should be protected as an MPA under the Oceans Act immediately.

DFO should facilitate a process to bring the Joint Strategy for Marine Protected Areas to conclusion as soon as possible, to support and coordinate the creation of a system of MPAs on the Pacific coast. DFO also has to engage in the broader process of establishing protected areas by supporting the implementation of Parks Canada's National Marine Conservation Areas with appropriate fisheries regulations, as the NMCAs reach that point in their development.Integrated planning should be rapidly implemented to support ecosystem-based management of marine waters. Progress on plans underway should be encouraged. At the same time, specific sources of habitat damage must be addressed. For example, a moratorium on invasive new developments, such as salmon farms, should be instituted until an integrated coastal zone management system is in place.

7.3 Conservation of Fisheries

Conservation of fisheries means sustaining the benefits from fishing: Aboriginal food, social and ceremonial harvest; recreational fishing; and commercial harvest. Current issues in fisheries conservation include: the change from competitive to quota fisheries and to user-pay to improve fisheries economics; and reducing mixed stock harvest while increasing selective fishing to improve conservation of fish stocks while sustaining or increasing levels of catch. Major mixed stock fisheries problems continue with multi-species (e.g. groundfish trawl) and multi-stock (e.g. salmon and shrimp trawl) fisheries. Whether managed to quotas or via competitive fishing, these problems can only be addressed by DFO altering the fisheries and enforcing selective harvesting.

In this report quota fisheries have been associated with a number of positive conservation factors. (The report does not address broader economic and social costs and benefits of individual quota-based fisheries management.) However, quotas per se only contribute to conservation by providing certainty of the amount of catch that will be taken. In competitive fisheries fishermen compete for catch. The amount of catch is controlled indirectly by limiting fishing time, area and gear. In quota fisheries the amount of catch is controlled directly by a catch quota that is a pre-season assigned amount of catch to each qualified quota holder. Direct control of the amount of catch is an improvement over competitive fisheries where significant over-harvest is common.

However, it is the other requirements implemented in concurrence with quota fisheries that make even more important contributions to conservation. For example, most quota fisheries require: at sea observers to monitor and record fishing location, practices, catch, bycatch, catch sorting, and weather and environmental conditions; prescribed ports for landing catch and mandatory catch certification; mandatory fishing log books; and hailing in and out of the fishery. In user-pay fisheries much of this information is collected and analyzed by third party contractors. Fishermen pay for this information collection and analysis, and enforcement, thereby reducing costs to DFO. In some cases, the overall total allowable catch is divided into commercial and research components (e.g. sea cucumber), thereby providing both the fish and the means to do stock assessment research. Some non-quota fisheries, such as for crab, have some of the same requirements.

In comparison with previous competitive fisheries, quota fisheries provide much more stock assessment information and control of harvest rates at less cost to DFO.

Implement meaningful harvest management plans

Integrated Harvest Management Plans (IHMPs) should be required for all fisheries and should include performance measures with specific targets and timelines. IHMPs should specifically deal with fishery related bycatch and habitat issues, as well as the potential development related impacts on habitat and fish production. The precautionary principle should be applied wherever information on fish stocks or their habitat is limited or weak, and total allowable catch should be set conservatively. These performance measures should be reported annually as part of the review and planning process. When targets or timelines are not met there should be an accountability process to determine the reasons for failure.

The recent McRae-Pearse report recommended requiring harvest agreements for each fishery. To provide continuity of direction, DFO Pacific Region and integrated harvest management

committees should enter into formal, multi-year, co-management agreements that are available to the public. Non-fishery interests should also be involved in planning.

Make a portion of total allowable catch available for research funding

Fisheries should be restructured to provide a portion of the TAC for research (both for study and to help finance the research). Managed correctly, this would also provide a conservation buffer. In multi-species fisheries, a larger portion of the TAC should be set aside to cover work on non-commercial species and ecosystem impacts.

Incorporate specific conservation targets into co-management of fisheries

Fisheries with user co-management groups provide a lot of information, structure and process to help to resolve problems of complexity, misinformation and incomplete information. The current DFO role in fisheries is to do scientific stock assessment, enforcement spot checks, and planning. Ideally, DFO would also be setting progressive, time specific targets for better management and conservation of quota and mixed stock fisheries. These targets should include reduced habitat damage from bottom trawling, more selective harvesting with reduced bycatch in mixed stock fisheries, and reduction of fishing mortality of non-target species and waste. Ideally, these targets would operate as a ratchet that would continually tighten on a pre-announced schedule, in somewhat the same manner as auto emission standards operate.

Improve enforcement

As conditions of licence, administrative law and sanctions should be clearly defined as a basis for improved enforcement. Third party enforcement with clear controls and disincentives for illegal activities should be expanded.

7.4 Overarching Conservation Processes

Require annual reporting on the achievement of conservation objectives

DFO Pacific Region should be required to provide annual reporting on total abundance, catch and recruitment by stock and on all new or significant factors affecting habitat or ecosystem productive capacity. Ideally this information should be posted on the DFO Web site, so that it would be generally accessible. It should be in a readable and informative format. Much of the information should be provided by fishermen, developers and related third parties. The stock information should come from direct observations by DFO staff or contractors, First Nations or public groups.

DFO Pacific Region should also be required to report annually on progress at meeting quantified fish, habitat and fishery conservation targets and performance measures. There should also be public reports on programs and expenditures, like the now discontinued, informative SEP annual reports. There are a number of comprehensive reporting systems that could serve as examples, including the Minnesota Milestones program developed by the Minnesota state government and the State of the Sound Web-based reporting system developed by the Puget Sound Action Team in Washington State.

Establish an independent accountability body

An independent accountability body should be established with responsibility for ensuring that governments (DFO, BC) meet their fish and habitat related conservation obligations. PFRCC was intended to fulfill that role. However, the Provincial government never actively participated. The Council is now funded and controlled by DFO. PFRCC could better function in this role if it were independent of DFO and also reported on BC programs. The Auditor-General of Canada and the Commissioner for the Environment and Sustainable Development tend to audit at much higher levels, but could be tied into the process to provide added weight to the conservation auditing process. The fish, habitat and fisheries resources are important Canadian and British Columbian assets that deserve at least the same level of accountability and reporting as that accorded to government expenditures of tax revenues.

Formalize and publicize Pacific Region's decision-making and reporting processes

The fish population, habitat and ecosystem priority-setting processes should be formalized, with a public information component and clear policy direction. When a fish population, habitat or ecosystem is being moved to a different level of monitoring, enforcement, or relaxed requirements, this decision should be formally reported to the public, for the record.

Establish a clear multi-party charter dealing with salmon conservation and related issues

Fishermen and all interests need more certainty before entering into long-term commitments for quota management, user-pay or other such arrangements. There should be a clear public agreement specifying how the various possible conservation, economic and social issues will be responded to. Ideally this agreement would be a charter for all conservation issues that both Federal and Provincial governments would buy into. A salmon charter should specify key conservation responsibilities and accountability processes so that future governments can't avoid their commitments. The Wild Salmon Policy could form the core of this charter if it is, in the end, rigorously conservation-focused and well-resourced by DFO in its implementation. Government should allocate a portion of the savings realized by salmon user-pay to support streamkeepers and public involvement groups as local watchdog groups. In the long-term, fisheries user-groups should work with and contribute to public involvement to close the loop with these groups and ensure that stocks and habitats are protected and restored.

7.5 Budgeting for Conservation

Present budget information with better reference to conservation objectives

DFO Pacific Region budget items should be identified by fish species, fishery and ecosystem as well as by DFO organizational unit and project activity. This would make it possible to measure total spending on each species, fishery, and ecosystem. It would also make it possible to identify all the DFO units involved in spending on a subject, thereby helping to identify opportunities to improve the efficiency, effectiveness and coordination of programs. Ideally, this should also include spending by agencies other than DFO on each species, fishery, and ecosystem. For example, Environment Canada and the Canadian Food Inspection Agency (CFIA) monitor paralytic shellfish poisoning in shellfish; the BC provincial government monitors and licences kelp harvest for herring spawn-on-kelp; RCMP and other police forces are involved in enforcement that might involve illegal transport of fish. This bigger picture accounting would

provide a better understanding of the true economics of the fisheries. It would also make it possible for DFO and the public to understand and appreciate the funding priorities.

Expand the sharing and publicizing of budget information for co-managed fisheries

Sharing of total budget information with co-management groups should be continued and expanded. This makes it possible to achieve cost-effective ways of conducting programs and generating needed information. This is especially important in user-pay co-management where DFO is demanding considerable contributions to cover DFO's conservation responsibilities. Without specific budget information this could only be partially done.

Determine a formula for the equitable sharing of salmon conservation costs

Because of the high habitat protection related costs for salmon, a working group should be established to determine what portion of salmon conservation costs should be borne by governments, what activities fishermen (sport, commercial and Native) and developers should pay for, and how costs are to be recovered.

Increase the use of management/watershed area co-management groups

Management/watershed area co-management groups should be integrated with the program direction of DFO projects, monitoring and projects of fishermen, developers, First Nations, and public involvement groups. Co-management groups would thus be encouraged to seek cooperative arrangements for information collection and sharing, and to use the available resources as leverage to seek matching funding from diverse sources. Also, in deciding how to implement projects, they could seek alternate sources or arrangements for providing a service. For example, a company or university might be able to conduct a project at lower cost than DFO, while still meeting the basic criteria/requirements.

7.6 Summary

To summarize the points made above, implementation of the following general recommendations by DFO Pacific Region would provide the foundation for significant improvements in the Region's ability to implement its conservation mandate.

- Provide clear, quantified, transparent, publicly understandable goals and performance measures, to be progressively applied, to guide the conservation and management of fish, fish habitat and fisheries.
- Make those who use or impact on fish, fish habitat and fisheries pay for authorization, mitigation, monitoring and researching their impacts.
- Adopt, cooperatively with the provincial government, a meaningful zoned fish habitat protection system based on land/water use co-planning, that will fairly treat those who make small or large habitat impacts, including moving ahead on MPAs and other fisheries protected areas.
- Document and regularly report, cooperatively 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 arms-length/independent accountability and reporting process to monitor and report on the conservation and management of fish, fish habitat and fisheries.
- Establish and maintain a coherent and consistent fisheries, habitat and water quality enforcement program.

8 APPENDICES

8.1 Extended Discussion of Quota Systems

Successful conservation of fish populations and fisheries management require:

- enough information to track and understand changes in population abundance, composition, behavior, and survival, and to set total allowable catch (TAC), and
- the ability to control and limit harvesting impacts on each population to target sustainable levels – not to exceed the TAC.

In competitive fisheries, such as the salmon fishery, fishermen compete with one another for catch. There is little incentive to conserve, rebuild or enhance stocks because any gain would be shared with all other fishermen. Instead, there are strong incentives to invest in fishing technology, to catch more fish per fishing period, to fish as intensively as possible, to withhold information, to poach, and to sell catch outside the statistical system. Competition also overwhelms voluntary compliance, especially where there are significant numbers of fishermen involved, as in the salmon fishery. Over-harvesting often results unless DFO has a strong and effective monitoring and enforcement coverage. Such effective coverage is costly in vessel and staff time and related costs.

In quota fisheries, although some of these same problems may exist, fishermen are provided with a defined share of the TAC and certainty of catch share without having to make a heavy investment to compete for fish. Fishermen can focus on maximizing catch quality and value and on reducing costs to increase their net earnings. Quota fisheries change incentives to contribute to meeting the basic conservation information requirement and to working together to increase the total stock production and TAC.

A key US National Research Council study which reviewed experience with individual fishing quotas (IFQs) in several countries concluded that "IFQs can be used in a preventive manner with stocks that are not overfished or to remedy existing overfishing, overcapitalization, and incentives to fish under dangerous conditions." (1999 p.192) In terms of conservation benefits, this study was guardedly positive: "Evidence of the effects of IFQs for the conservation of fish stocks is mixed and there are few generalizable statements of fact that can be made… However, to the extent that IFQs are enforced, they can keep harvests within a TAC; open-access fisheries often exceed their TACs." (National Research Council 1999 p.193) This report recommended that Congress lift the moratorium on IFQ programs that had been in place in the US since 1996, but to regulate any IFQ system to counter a list of negative impacts.

Fujita et al., like the National Research Council, emphasize that ITQs work under certain conditions related to suitable fisheries, and are not a panacea. They do conclude, however, that this form of management "is a promising tool that has the potential to address the root causes of over-fishing, and the mad race for fish: lack of incentives for conservation, strong incentives to over-invest, reduced profitability, and chronic economic distress that creates pressure for unsustainable harvests." (p.S148) In contrast, Copes (2000), arguing on an *a priori* basis, is critical of individual quotas. He asserts that several features make individual quota systems "raise the risk of damage to exploited fish stocks beyond the risks that apply to fishing activity generally…" (p.5). He is mainly concerned with negative "externalities" related to management

requirements (e.g., relatively inflexible TACs) and system-induced behaviour (e.g. quota busting).

There can be severe problems in either competitive or quota fisheries if there are no strong and effective management and enforcement programs. These programs require adequate funding and clearly defined arrangements. In most BC quota fisheries, at-sea and port monitoring and enforcement counter the incentives to high-grade catch and make unaccounted sales.

In the past, government has paid almost all conservation and management costs. However, in recent years, budget allocations and priorities (mainly set at the national level) have meant that DFO cannot cover these costs.

"From the mid-80s until the present, DFO (and government generally) is beset by fiscal restraint. With a higher conservation bar, increased demands from users, and the need for more and better fisheries data, the job of management has gotten larger and more difficult, but financial and human resources have not kept up with demand." (Nelson and Turris 2004).

If the direction of these government spending decisions does not change radically and soon, alternate arrangements are required for effective conservation of stocks. There are a few options:

User-Pay: Fishermen would pay from their earnings in general. Fisheries could be structured and licensed so that those that benefit directly from the resource would pay at least the costs of monitoring and enforcement of their fishery and stocks. As there must be enough profitability in the fishery to cover these costs, user-pay fisheries are often associated with other changes, such as fleet reduction, to increase average catch per fisherman. Ethically, it can be argued that further "taxing the fishermen" to pay for government's conservation responsibilities is unfair.

Resource-Pay: A specific portion of the TAC would be set aside to cover conservation costs as well as the costs of harvesting and handling that part of the TAC. At present, DFO is strictly limited on resource-pay arrangements that it can implement. And again, some regard reductions to the TAC as a tax on fishers.

Charity-Pay: Interest groups or charities could voluntarily pay for specific conservation, monitoring and/or research that they are interested in.

Cost-Reduction: To some extent, fisheries and their management could be altered to reduce management risks and costs. For example, harvest rates could be reduced to make management less risky and require less information and enforcement. However, the cost reductions realized would be much less than the value of catch foregone. Fisheries could be structured to make monitoring easier and cheaper so that fishing interests could collect needed information as part of their operations.

Changes to Fishermen's Incentives: Changing management to provide incentives for fishermen to contribute to conservation rather than countering it would clear the way for DFO-fishermen cooperation on meeting conservation requirements.

If cutbacks in DFO staff, budgets, and programs continue, some form of quota management offers one possible approach to meeting basic conservation requirements. However, there are some concerns associated with quota fisheries because some applications have had adverse conservation, social and/or economic impacts. Conservation problems have generally been related to enforcement and monitoring failures. Any social and economic problems have been related to the specific quota arrangements implemented.

There are many variations on the basic theme, ranging from non-transferable, personal quotas, through quotas with specific transfer and holding limits, to fully transferable quotas. Individual transferable quotas (ITQ) that can be transferred without ownership restrictions have resulted in consolidation of quota and industrialization of fisheries, with high social impacts on community employment. Non-transferable individual quotas have prevented consolidation of quota ownership to improve fisheries economics. Non-transferable quotas still allow short-term harvesting arrangements between fishermen to address changing fish abundance or other variables.

Other variations include:

- Community quotas, essentially held by pools of fishermen, with the pool deciding how many and who fishes and how to share the costs and earnings; and
- Allocating TAC by activity to address uncertainties about population dynamics, abundance and behavior, or fleet impacts. For example, the overall sea cucumber TAC is divided into conservation, scientific and commercial components. The conservation TAC is protected in unharvested areas. The scientific TAC can only be harvested under strict controls to provide a better understanding of sea cucumber dynamics and the impacts of harvesting and various fishing methods. It can also be used to pilot test new fishing and handling requirements.

In long-lived species that are fished at a number of ages, quotas are set and assessed annually based on the abundance and impacts on the various age classes of the stocks and populations involved.

In species such as salmon, that are only fished at one or two ages, annual quotas would be too risky unless they were set for the lowest likely return level, which would forego most of the TAC in most years. Instead, TAC and quotas must be set in-season, as TAC now is set in competitive fisheries.

From a conservation point of view, the key issue is not quota vs. competitive fishing. Rather it is how well the TAC and other management tools for conservation work. The focus should be on ensuring that whatever form of management is implemented meets conservation requirements and does not put fish populations at undue risk.

Quota management, properly implemented, can be more conservation- and cost-effective than competitive fisheries. Under current circumstances, with DFO's weakened capacity for management, carefully structured and implemented quota fisheries should be used, where appropriate, to help achieve conservation objectives. Quota fisheries with user-pay offer the potential for improved conservation without increased government costs – if they are implemented with appropriate levels of enforcement and monitoring to address conservation requirements and if the quotas are structured to address social and conservation concerns, instead of just focusing on economic concerns. In other words, it is the structure of the quota fishery and related monitoring and enforcement that determine whether and how much more effective it is than competitive fisheries, and the extent of social and economic changes that result. These latter changes are the basis of most of the criticism of quota fisheries in BC to date.

Solid data that prove generally positive or negative conservation impacts of quota fisheries in BC appears to be lacking. A recent Ecotrust report has pointed out possible negative effects from phenomena potentially associated with quota fisheries, including loss of incentives for conservation at the community level, incentives for short-term profits among industry quota holders, privileged access to data by industry consultants, unsustainable behaviour by fishermen,

undue industry influence, and high costs of quotas driving pressure for high catch levels (Ecotrust 2004). At the same time, data do not show negative conservation outcomes stemming from these factors at this point. The conservation record is "inconclusive" in the view of some observers (Ecotrust 2004 p.iii), and positive in the view of others (Jones 2003, Jones and Walker, eds. 1997).

Some argue that as quotas increasingly place a form of ownership of the resource into the hands of fishermen, the public stake in the conservation of fisheries is diminished (UFAWU-CAW 2004). There is concern that "…the disenfranchisement of rural and Aboriginal communities adjacent to fisheries resources undermines the stewardship role these communities could play in promoting fisheries conservation…" (Ecotrust 2004 p.31).

There are also conservation-related concerns that economic forces could work against the ability of the quota system to pay for monitoring and enforcement in a given fishery if the market for the fishery crashes – as has recently been the case in the urchin dive fishery. With decline in profits, contributions to monitoring and enforcement also shrink. Both of these potential risks – disenfranchisement of those interested in conservation of fisheries, and lack of funding for monitoring and enforcement – have already been realized under the system of competitive fisheries in BC, to some extent.

8.2 References Reviewed for the Case Studies

8.2.1 Groundfish/Rockfish Conservation Area Policy

Ardron, Jeff. 2004. "Scientific Concerns regarding the Selection of Rockfish Conservation Areas in British Columbia." Letter from Jeff Ardron on behalf of the Pacific Marine Conservation Caucus to Lynne Yamanaka and the Rockfish Conservation Area Committee, dated August 16, 2004.

Canadian Groundfish Research and Conservation Society (brochure, n.d.)

DFO. 2001. Proceedings of Inshore Rockfish Conservation Workshop, Nov. 21-22, 2001.http://www-ops.pac.dfo-mpo.gc.ca/fm/Groundfish/Images/ircworkshoprpt.pdf (Contains multiple useful presentations.)

DFO. 2004a. Rockfish Conservation Strategy documents. http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/fisheriesmgmt/rockfish/default_e.htm

DFO. Pacific Region. 2004a. "Rockfish Conservation Areas Implemented April 1," Press Release dated March 26, 2004 (includes related backgrounders)

DFO. Pacific Region. 2004b. Protecting British Columbia's Rockfish.

Glavin, Terry (for the Sierra Club of British Columbia). 2001a. Groundfish: a Case Study: The Conservation of Marine Biological Diversity and Species Abundance on Canada's West Coast: Institutional Impediments.

Glavin, Terry. 2001b. "Take stock while there are still some fish to catch," Vancouver Sun, December 19, 2001.

Glavin, Terry. 2002. The Right to be Responsible: a Framework for the Rebuilding and Conservation of Inshore Rockfish and Lingcod on the B.C. Coast. Vancouver: Sierra Club of B.C., CPAWS, David Suzuki Foundation, World Wildlife Fund and Watershed Watch Salmon Society. http://bc.sierraclub.ca/programs/marine/publications.shtml

Hume, Stephen. 2002. "Rockfish 'conservation' based on wishful thinking," Vancouver Sun, May 30, 2002.

Pacific Fisheries Management, Inc. 2003. Future Direction of the Commercial Groundfish Fisheries in British Columbia. Prepared for BC MAFF, June 2003.

Sierra Club of Canada, BC Chapter. 2003. Groundfish Fisheries Reform: Backgrounder (December 2003)

Vancouver Sun, December 8, 2004. "DFO bid to block sport-fishing ban in Barkley Sound"

Wallace, Scott, Ph.D., and J. Ardron. 2003. Submission on the proposed rockfish conservation strategy. Sierra Club of Canada, BC Chapter; Living Oceans Society; Canadian Parks and Wilderness Society. http://www.livingoceans.org/documents/RCA_report_2003b.pdf

Yamanaka, K.L. and L.C. Lacko, L.C. 2001. Inshore Rockfish Stock Assessment for the West Coast of Canada and Recommendations for Management. DFO Canadian Science Advisory

Secretariat (CSAS) Research Document 2001/139. http://www.dfo-mpo.gc.ca/csas/Csas/English/Research_Years/2001/2001_139e.htm

8.2.2 Sablefish/Black Cod Quota Fishery

Canadian Sablefish Association. 2004. Position on Sablefish Aquaculture: April 2004. www.canadiansablefish.com

"Canada's OK for sablefish and halibut farms faulted: report," WorldSeafoodMarket.com, Sept. 29, 2003. http://www.growfish.com.au/content.asp?contentid+695

Edwin Blewett and Associates, Inc. 2002. Status Report on Co-Managed Fisheries.

Huppert, Daniel D. and Barbara Best. 2004. Final Report: Study of Supply Effects on Sablefish Market Price. Seattle: University of Washington, April 7, 2004.

Jones, Laura (with Miriam Bixby). 2003. Managing Fish: Ten Case Studies from Canada's Pacific Coast. Vancouver: Fraser Institute.

Robbins, Jim, " Pasturing Sablefish in the Pacific," New York Times, September 22, 2004.

Robichaud, D., M. Labelle and K.K. English, for LGL Limited. 2004. A Preliminary Assessment of the Issues Associated with Sablefish Aquaculture. Prepared for the Canadian Sablefish Association, April 16, 2004.

Stephen, Craig, DVM, PhD and Erin Fraser BSc., DVM MSc. 2004. British Columbia Sablefish Aquaculture Risk Assessment Based on the National Codes of Introductions and Transfers, November 2, 2004, Centre for Coastal Health, Nanaimo, BC.

Wappel, Tom (Chair, House Standing Committee on Fisheries and Oceans). 2004. Letter to the Hon. Geoff Regan, Minister of Fisheries and Oceans, dated May 17, 2004, calling for environmental impact analysis of BC sablefish aquaculture.

Wickham, Eric. 2002. Dead Fish and Fat Cats: a No-Nonsense Journey through our Dysfunctional Fishing Industry. Vancouver: Granville Island Publishing.

8.2.3 Rivers Inlet/Smith Inlet Sockeye Salmon

Beamish, R.J., G.A. McFarlane, J.R. King. 1999. Fisheries Climatology: understanding decadal scale processes that naturally regulate British Columbia fish populations. In Fisheries Oceanography: A Science for the New Millennium. T. Parsons and P. Harrison [eds.]

DFO. 2001. 2001 Post Season Review and 2002 Planning Framework – Salmon. Central Coast Areas 7 to 10.

Hilland, R.T. 2004. Personal communications.

Holtby, B. (committee chair). 2000. Recommendations for a Recovery Plan for Rivers Inlet and Smith Inlet Sockeye Salmon. DFO Draft Recovery Plan.

McKinnell, S.M., C.C. Wood, D.T. Rutherford, K.D. Hyatt, D.W. Welch. 2001. The Demise of Owikeno Lake Sockeye Salmon. N.Amer. J. Fish. Mgt 21:774-791, 2001

PFRCC. 2000. Pacific Fisheries Resource Conservation Council Annual Report 1999-2000

PFRCC 2001. Pacific Fisheries Resource Conservation Council Annual Report 2000-2001 pa 24

8.2.4 Cultus Lake/Sakinaw Lake Sockeye Salmon

Cultus Sockeye Recovery Team. 2004. National Recovery Strategy for Sockeye Salmon, Cultus Lake population, in British Columbia. (Draft, September 7, 2004). National Recovery Strategy No. XXX. Recovery of Nationally Endangered Wildlife (RENEW). Ottawa, Ontario.

Cultus Sockeye Stock Assessment. 2004. Review and Comment on "Financial Considerations Associated with Potential SARA Listing of Sakinaw and Cultus Lake Sockeye," (extract). Prepared by Cultus Sockeye Stock Assessment – Fish Management Working Group, October 7, 2004.

DFO. Pacific Region. 2004a. The Species at Risk Act: a Fisheries and Oceans Canada Regional Perspective: a guide to aquatic species planning in the Pacific Region.

DFO. Pacific Region. 2004b. Background Web Page: SARA: Salmon http://www.pac.dfo-mpo.gc.ca/sara/salmon_e.htm

Environment Canada. 2004. News Release, "Minister of the Environment Makes Recommendations on Adding New Species to the Species at Risk Act," October 22, 2004. http://www.ec.gc.ca/press/2004/041022_n_e.htm

GSGislason & Associates. 2004. Socio-Economic Implications of the Species-at-Risk Act: Sakinaw & Cultus Sockeye. Prepared for Canada Dept. of Fisheries and Oceans. Vancouver, BC.

Sakinaw Sockeye Recovery Team. 2004. National Recovery Strategy for Sockeye Salmon, Cultus Lake population, in British Columbia. (Draft, September 16, 2004). National Recovery Strategy No. XXX. Recovery of Nationally Endangered Wildlife (RENEW). Ottawa, Ontario.

8.2.5 West Coast Vancouver Island Aquatic Management Board

BC Seafood Alliance. 2001. Position Statement on Effective Consultation, p. 7.

Savoie, Donald J. (Chair), G. Fileau and Patricia Gallaugher.1998. Partnering the Fishery: Report of the Panel Studying Partnering. (Prepared for DFO) www.dfo-mpo.gc.ca/media/newsrel/1998/hq-ac61_e.htm. DFO backgrounder on this report: http://www.dfo-mpo.gc.ca/media/backgrou/1998/hq-ac90_e.htm

Tank, Suzanne.2004. Seas of Change: Ten Recommendations for Sustainable Fisheries on the B.C. Coast. Vancouver: David Suzuki Foundation http://www.davidsuzuki.org/files/Oceans/DSF-SeasofChange1.pdf

West Coast Vancouver Island Aquatic Management Board (WCVIAMB). 2004. www.westcoastaquatic.ca/about.htm

8.2.6 Georgia Strait Coho Salmon

DFO. 1977. The Salmonid Enhancement Program. DFO limited publication.

DFO. 1986a. Pacific Region Salmon Stock Management Plan: Inner South Coast (including Fraser River). Volume I.

DFO 1986b. Pacific Region Salmon Stock Management Plan: Coho. Volume L.

DFO. Pacific Region. 2004. http://www.pac.dfo-mpo.gc.ca

PFRCC. 2002. Pacific Fisheries Resource Conservation Council Annual Report 2001-2002.

Sweeting, R.M., R.J. Beamish, D.J. Noakes, and C.M. Neville. 2002. Replacement of wild coho salmon by hatchery-reared coho salmon in the Strait of Georgia over the past three decade. North. Amer. J. Fish. Manage.

8.2.7 Establishment of Oceans Act Marine Protected Areas

Ban (nee Lerch), Natalie (Canadian Parks and Wilderness Society). 2003. Marine Protected Areas as a Tool for Conservation. Presentation at Examining Best Practices in Coastal Zone Planning Workshop, Alert Bay, B.C.

Ban, Natalie, PhD candidate, UBC Fisheries Center. 2004. Interview, Vancouver, October 5.

Canada and British Columbia. 1998. Marine Protected Areas, A Strategy for Canada's Pacific Coast, Discussion Paper, A Joint Initiative of the Governments of Canada And British Columbia.

Canadian Parks and Wilderness Society. July 2002. Press Release "Conservation group slams DFO for failing to protect unique Hecate Strait sponge reefs – new damage reported by scientists".

Canadian Parks and Wilderness Society. 2004. Protecting the Glass Sponge Reefs from Offshore Oil and Gas.

Curtis, Malcolm. 2001. "British Columbians want coast protected, says poll." Victoria Times Colonist, November 27, 2001.

David Suzuki Foundation. 2002. Press Release "Plan to protect unique sponge reefs and maintain fisheries flawed" July 11, 2002.

DFO. 2000. Hexatinallid sponge reefs on the British Columbia continental shelf: geological and biological structure. DFO Pacific Region Habitat Status Report 2000/02.

DFO Pacific Region MPA Home Page:
http://www.pac.dfo-mpo.gc.ca/oceans/mpa/default_e.htm

Dower, John F. and Frances J. Fee. 1999. Oceans Background Report, The Bowie Seamount Area, Pilot Marine Protected Area in Canada's Pacific Ocean. Report for DFO, Sidney, BC.

Fisheries and Oceans Canada. no date. Marine Protected Areas Pilot Project Fact Sheets.

Fisheries and Oceans Canada. June 2001. Endeavour Hydrothermal Vents Marine Protected Area Management Plan.

Fisheries and Oceans Canada. July 18, 2002. News Release "Groundfish trawlers help to protect unique sponge reefs in BC".

Fisheries and Oceans Canada, March 7, 2003. News Release "Minister Thibault announces Canada's first marine protected area". http://www.dfo-mpo.gc.ca/media/newsrel/2003/hq-ac10_e.htm

Globe and Mail. 2003. Editorial: Beyond oil and gas off B.C.'s coast. July 21, P. A10.

Hume, Stephen. 2000. "Maritime hazard is a haven for marine life," Vancouver Sun 29 July 2000.

Jamieson, G.S. and L. Chew. 2002. Hexactinellid sponge reefs: areas of interest as Marine Protected Areas in the North and Central Coast areas. Canadian Science Advisory Secretariat Research Document 2002/122. http://www.dfo-mpo.gc.ca/csas/csas/English/Research_Years/2002/2002_122e.htm

Jessen, S., and N. Ban. 2003. Establishing marine protected areas in British Columbia: an NGO perspective. Pages 377-387 in J. P. Beumer, A. Grant, and D. C. Smith, editors. Aquatic protected areas: what works best and how do we know? Australian Society for Fish Biology, Cairns, Australia.

Jessen, Sabine, Conservation Director, Canadian Parks and Wilderness Society, BC Chapter. 2004. Interview, Vancouver, December 11, 2004.

Krautter, Manfred, University of Stuttgart, homepage: http://www.porifera.org/a/ciall.htm

LeRoy, Sean. 2003. Race Rocks: From Ecological Reserve to Marine Protected Areas. The Log, Friends of Ecological Reserves Newsletter, Spring 2003 p. 8-9.

MPA News. June 2001. Canada to Designate MPA for Hydrothermal Vents.

OECD (Organization for Economic Cooperation and Development). 2004. OECD Environmental Performance Reviews, Canada.

Pynn, Larry. Offshore habitat at risk. p.B7. Vancouver Sun, May 7, 2004.

Wallace, Scott and David R. Boyd. 2000. Out of Sight, Out of Mind and Almost Out of Time: Towards an effective system of Marine Protected Areas in British Columbia. Victoria: Sierra Club of British Columbia.

WSSD (World Summit on Sustainable Development). 2002. Plan of Implementation. http://www.johannesburgsummit.org/html/documents/summit_docs/2309_planfinal.htm

8.2.8 Salmon Aquaculture – Sea Lice Research

BC Ministry of Agriculture, Food and Fisheries (MAFF). Provincial Action Plan – News release and Backgrounder.

BC Ministry of Agriculture, Food and Fisheries (MAFF). 2003a. Backgrounder – Broughton Archipelago Action Plan. 2003: Victoria, BC.

BC Ministry of Agriculture, Food and Fisheries (MAFF). 2003b. Pink Salmon Migration Corridors in the Broughton – January 2003: Victoria, BC.

BC Ministry of Agriculture, Food and Fisheries (MAFF). 2003c. Status report on sea lice monitoring in the Broughton Archipelago. 2003: Victoria, BC. and see http://www2.news.gov.bc.ca/nrm_news_releases/2003AGF0004-000137.htm

BC Ministry of Agriculture, Food and Fisheries (MAFF). 2004a. Provincial Sea Lice Management Strategy. http://www.agf.gov.bc.ca/fisheries/health/sealice_MS_2004.htm

BC Ministry of Agriculture, Food and Fisheries (MAFF). 2004b. 2004-2005 Sea Lice Monitoring Program. http://www.agf.gov.bc.ca/fisheries/health/Sealice/Sealice_Monitoring_Program.pdf

BC Ministry of Small Business and Economic Development. 2004. Press release, "$2.8 million federal, provincial support for seafood industry," September 28, 2004.

Broughton Archipelago Stewardship Society.2004 http://www.watershed-watch.org/PDFs/BASSNewsletter1.pdf

Connell, Suzanne. 2004. Regulating Salmon Aquaculture in BC: a Report Card. Nanaimo. Georgia Strait Alliance. http://www.georgiastrait.org/BCFishFarmReport.php

DFO. 2003a. "Thibault Announces Pink Salmon Action Plan for the Broughton Archipelago, Press release and associated backgrounder, Feb. 20, 2003 http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2003/nr011_e.htm

DFO. Pacific Region 2004. Pacific Region Pink Salmon Action Plan: Introduction to and Weekly Results of the Marine Research Project in 2004.http://www-sci.pac.dfo-mpo.gc.ca/mehsd/sea_lice/2004/2004_intro_e.htm

DFO. PSARC. 2004. Proceedings of the Pacific Scientific Advice Review Committee (PSARC) Habitat and Salmon Subcommittee Meeting, April 6-7, 2004. "Sea Lice/Pink Salmon Report, May 2004." http://www.pac.dfo-mpo.gc.ca/aquaculture/psarcaqua_e.htm

Gallaugher, P., J. Penikett, and M. Berry, Speaking for the Salmon Workshop: A Community Workshop to Review Preliminary Results of 2003 Studies on Sea Lice and Salmon in the Broughton Archipelago Area of British Columbia. 2004. Burnaby, BC: Centre for Coastal Studies, Simon Fraser University. http://www.sfu.ca/coastalstudies/linking/pdf/SeaLice_proceedings.pdf

Gardner, J. and D.L. Peterson. 2003. Making sense of the aquaculture debate: analysis of the issues related to netcage salmon farming and wild salmon in British Columbia. 2003, Pacific Fisheries Resource Conservation Council: Vancouver, BC.

Government of Canada. Privy Council Office. 2003. A Framework for the Application of Precaution in Science-based Decision Making about Risk. http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=precaution&Doc=precaution_e.htm

Hume, Stephen, A. Morton, B.C. Keller, R.M. Leslie, O. Langer and D. Staniford. 2004. A Stain Upon the Sea: West Coast Salmon Farming. Harbour Publishing: Madeira Park, BC.

Kines, Lindsay. 2004. "$2.4 million funds research facility: Campbell River centre will probe aquaculture issues but some critics are questioning its motives," Victoria Times-Colonist, September 29, 2004.

McNulty, Jim. 2003. "Compromised DFO running out of time to fix sea-lice crisis," Vancouver Province, February 5, 2003.

Morton, A., R. Routledge, C. Peet, and A. Ladwig, Sea lice Lepeophtheirus salmonis infection rates on juvenile pink Oncorhynchus gorbuscha and chum salmon Oncorhynchus keta in the nearshore marine environment of British Columbia, Canada. Canadian Journal of Fisheries and Aquatic Sciences, 2004: in press.

PFRCC. 2002. Advisory: The Protection of Broughton Archipelago Pink Salmon Stocks. 2002, Pacific Fisheries Resource Conservation Council: Vancouver, BC. And see http://www.fish.bc.ca/html/fish3200.htm

Regan, Hon. Geoff. 2004. Letter from Minister of Fisheries Geoff Regan to Lynn Hunter, CAAR, November 22, 2004, re: salmon farm/sea lice issues.

Sea Lice Action Plan. 2003. Minutes of Meeting, Sea Lice Action Plan, Meeting of Scientists, Simon Fraser University, Feb. 13, 2003. www.sfu.ca/cstudies/science/salmon/SeaLiceMinutes.doc

University of British Columbia. 2003. Science Forum on Sea Lice. February 2003. Action Plan, Meeting of Scientists, Feb. 13, 2003

Watershed Watch Salmon Society. 2001. Salmon farms, sea lice and wild salmon: a Watershed Watch report on risk, responsibility and the public interest. Watershed Watch Salmon Society: Coquitlam, BC.

Watershed Watch Salmon Society. 2004. Sea Lice and Salmon: Elevating the Dialogue on the Wild-Farmed Salmon Story. Watershed Watch Salmon Society:Coquitlam, B.C. http://www.watershed-watch.org/ww/Sealicefacts/sealicefacts_main.htm

8.2.9 Okanagan First Nation – Skaha Lake Cooperative Effort

Machin, Dawn. 2000. “Okanagan Nation Fisheries Commission,” Aboriginal Fisheries Journal, July 2000, p. 4. http://www.bcafc.org/news/newsletters/afj_july00.pdf

Northwest Power and Conservation Council. 2003. “Success Stories – Okanagan River: Canadian and U.S. tribes take steps toward international sockeye salmon restoration.” http://www.nwcouncil.org/fw/stories/okanagan.htm

Okanagan Nation Alliance. 2003. Major Initiatives: Reintroduction of Sockeye. http://www.syilx.org/naturalresources-majorinitiatives.php

Okanagan Nation Alliance. 2004a. Press Release, “Okanagan Nation returns sockeye salmon to Skaha Lake for the first time in more than half a century.” June 1, 2004. http://www.gatheringplacefirstnationscanews.com/PressReleases/060104_02.htm

Okanagan Nation Alliance. 2004b. Okanagan Sockeye Reintroduction Backgrounder. http://www.gatheringplacefirstnationscanews.com/PressReleases/060104_02.htm

8.2.10 Salmonid Enhancement

Gardner, Julia, D.L. Peterson, A. Wood and V. Maloney. 2004. Making Sense of the Hatchery Debate. Prepared for PFRCC. http://www.fish.bc.ca/reports/pfrcc_making_sense_of_hatchery_impacts_debate_2004-03-05.pdf

Harvey, Brian and D. Greer. 2004. Reality Stewardship: Survival of the Fittest for Community Salmon Groups. Vancouver, B.C. Prepared for the Vancouver Foundation and PFRCC. http://www.fish.bc.ca/reports/pfrcc_reality_stewardship.pdf

Innell, David (Regional Director, Corporate Services, DFO Pacific Region). 2004. SEP Update: Presentation to the BC Sport Fishing Institute, Richmond, November 2004. PowerPoint Presentation. http://www.sportfishing.bc.ca/action_update/HTMLobj-70/Sue_Farlinger_FutureSEP.pdf

Lill, Alan and Oliver Kent. 2003. Review of SEP Delivery Model and Production Strategies: Letter Report to DFO Pacific Region, prepared by IBM Global Services, Business Consulting Services, and A.F. Lill and Associates, December 31, 2003.

Long Live the Kings. 2003. Hatchery Reform in Puget Sound and Coastal Washington. http://www.lltk.org/hatcheryreform.html

8.2.11 Sea Cucumber

Campagna, S. and Hand, C. 2004. Baseline Density Estimates From Sea Cucumber (*Parastichopus Californicus*) Surveys Conducted in British Columbia, Canada.

Canadian Science Advisory Secretariat Research Document 2004/065 http://www.dfo-mpo.gc.ca/csas/Csas/English/Research_Years/2004/2004_065_E.htm

D&D Pacific Fisheries. 2004. D&D Pacific Fisheries Ltd website. http://www.d-dpacificfisheries.com

DFO. 2004a. DFO website re history of fishery. http://www-ops2.pac.dfo-mpo.gc.ca/xnet/content/Shellfish/sea_cucumber/history_cucumber.htm

DFO. 2004b. DFO website re Integrated Fisheries Management Plan for Sea Cucumber dive fishery. http://www-ops2.pac.dfo-mpo.gc.ca/xnet/content/MPLANS/plans04/Scu04pl_final.pdf

8.2.12 Freshwater Habitat

British Columbia. Office of the Auditor-General. 2004. Salmon Forever: an Assessment of the Provincial Role in Sustaining Wild Salmon. 2004/05 Report 5.

BC Ministry of Water Land and Air Protection. 2004. Riparian Areas Regulation (to become effective March 2005). Informational Web page. http://wlapwww.gov.bc.ca/habitat/fish_protection_act/riparian/riparian_areas.html

Canadian Hydropower Association. 2003. CHA Forum on Hydropower. Habitat Management: Beyond the Blueprint. PowerPoint presentation by P. LeBlanc, October 21, 2003. http://www.canhydropower.org/hydro_e/ppt/P_Leblanc_presentation.ppt

Coast River Environmental Services. 1997. Urban Referral Evaluation: An Assessment of the Effectiveness of the Referral Process for Protecting Fish Habitat (1985 – 1995). Ministry of Environment, Lands and Parks (Resource Stewardship Branch) (Victoria, BC), and Fisheries and Oceans Canada (Fraser River Action Plan) (Vancouver, B.C.) http://www.dfo-mpo.gc.ca/Library/225604.pdf

Commission for Environmental Cooperation.2003. Factual Record: BC Logging Submission (SEM-00-004). http://www.cec.org/files/pdf/sem/00-4-FFR_en.pdf For a complete chronology/history of the case file, see http://www.cec.org/citizen/submissions/details/index.cfm?varlan=english&ID=55

DFO (Habitat and Enhancement Branch). 1998. Status of Habitat and Habitat Protection in British Columbia and the Yukon. Presentation to PFRCC, Nov. 13, 1998.

DFO. 2001. Policy for the Management of Fish Habitat. Minister of Supply and Services. First published in 1986.

DFO. 2004a. Habitat Assessment Branch. Completed Projects and Publications. Reference and links to a number of pertinent studies and reports, 1997-2003. http://www-heb.pac.dfo-mpo.gc.ca/assessment/completed_e.htm

DFO. 2004b. Overview of DFO's 5-Point Environmental Process Modernization Plan. Presentation to National Non-Governmental Organizations. June 15, 2004. (PowerPoint deck)

DFO. 2004c. News Release: DFO and Industry Associations Sign Fish Habitat Agreement. October 26, 2004. Includes link to Terms of Reference for the agreement. http://www.dfo-mpo.gc.ca/media/backgrou/2004/hq-ac85a_e.htm

DFO. 2004d. Fisheries and Oceans Canada – Environmental Process Modernization Plan. Contributing to the Smart Regulation Agenda. Presentation to the Forum on Hydropower. October 28, 2004. (PowerPoint deck)

DFO. 2004e. Speaking Notes for Hon. Geoff Regan, Minister of Fisheries and Oceans at the Standing Committee on Fisheries and Oceans on the Department's Main Estimates. Ottawa, ON. Nov. 18, 2004. http://www.dfo-mpo.gc.ca/media/speech/2004/20041118_e.htm

Dovetail Consulting Inc. 1996. Urban Stream Stewardship: from Bylaws to Partnerships: an Assessment of Mechanisms for the Protection of Aquatic and Riparian Resources in the Lower Mainland.

Dovetail Consulting.1999. An Evaluation of DFO Involvement in Land and Resource Management Planning (LRMP) in British Columbia.

G3 Consulting Ltd. 2000. No Net Loss of Fish Habitat: an Audit of Coastal Log Handling Facilities in British Columbia, 1994-1999.

Harper, D. J. and J.T. Quigley. 2000. No Net Loss of Fish Habitat: An Audit of Forest Road Crossings of Fish-Bearing Streams in British Columbia, 1996-1999. Can.Tech. Rep. Fish. Aquat. Sci. 2319: 44 pp. http://www.dfo-mpo.gc.ca/Library/247265.pdf

Harvey, Brian and D. Greer. 2004. Reality Stewardship: Survival of the Fittest for Community Salmon Groups. Vancouver, B.C. Prepared for the Vancouver Foundation and PFRCC.

Howard Paish and Associates. 1997. Stream Stewardship and Fish Advocacy: an Assessment of the Current and Potential Community Group Involvement in the Lower Fraser Valley.

Langer, Otto. 2002. Fish Habitat Conservation Issues in the Fraser River Basin. In: Pinnell, Nadine (ed). Symposium Proceedings: You and the Fraser River: Exploring Connections and Conservation.

Living Blueprint for B.C. Salmon Habitat: an Action Plan produced by an Independent Panel. 1998. Pacific Salmon Foundation: Vancouver.

Moore, R.D. 2002. Comments on "A Results-Based Forest and Range Practices Regime for British Columbia: Discussion paper for public review and comment." http://faculty.forestry.ubc.ca/rbc/Dan_Moore.doc

Office of the Auditor-General of Canada. 2004. Report of the Commissioner of the Environment and Sustainable Development to the House of Commons, Chapter 5: Fisheries and Oceans Canada – Salmon Stocks, Habitat and Aquaculture.

Precision Identification Biological Consultants. 1998. Wild, Threatened, Endangered and Lost Streams of the Lower Fraser Valley. Summary Report. http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/229864.pdf

Quadra Planning Consultants. 1997. No Net Loss of Habitat: Assessing Achievement. Workshop Proceedings. Fraser River Action Plan, Vancouver, BC. 68p.

Quigley, J.T., and D.J. Harper. 2003. Enhanced Delivery of Canada's Policy for the Management of Fish Habitat (1986): An Evaluation of the Interaction between Fisheries and Oceans Canada and the Fraser Basin Council. Can. Manuscr. Rep. Fish. Aquat. Sci. 2636: 142 pp http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/271867.pdf

Rosenau, M. and M. Angelo. 2001. The role of public groups in protecting and restoring freshwater habitats in British Columbia, with special emphasis on urban streams. PFRCC Advisory Report.

Werring, John and Doug Chapman. 2002. Law and Disorder: a review of habitat legislation for BC's salmon streams. Pages 149-163 in Harvey, Brian and M. MacDuffee, eds. 2002. Ghost Runs. Victoria. Raincoast Conservation Society.

West Coast Environmental Law. 2004a. Please Hold: Someone Will Be With You. A report on diminished monitoring and enforcement capacity in the (BC) Ministry of Water, Land and Air Protection. www.wcel.org/wcelpub/2004/14099.pdf

West Coast Environmental Law.2004b. Deregulation Backgrounder. Riparian Areas Regulation. http://www.wcel.org/deregulation/RAR.pdf

West Coast Environmental Law.2004c. ""Flexible" Fish Guidelines May Harm Fish." WCEL Newsletter, Vol. 30:02. November 2004. p. 6.

8.3 References Cited Elsewhere in the Report

BC Ministry of Agriculture, Food and Fisheries 2004. Press release, "Canada and B.C. welcome Yukon to new Pacific Council of Fisheries and Aquaculture Ministers," December 22, 2003," with associated Backgrounder. http://www2.news.gov.bc.ca/nrm_news_releases/2003AGF0030-001141.htm#

Boyd, David R. 2003. Unnatural Law: Rethinking Canadian Environmental Law and Policy. UBC Press. www.unnaturallaw.ca

Canadian Council of Fisheries and Aquaculture Ministers (CCFAM). 2002. "Fisheries and Aquaculture Ministers Move Forward on an Number of Joint Initiatives." Press release issued *September 26, 2002*. http://www.aquaculture.ca/English/CCFAM/CAIA_Press3.html http://www.dfo-mpo.gc.ca/media/speech/2002/20020926_e.htm

Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) 2003 http://www.dfo-mpo.gc.ca/media/newsrel/2003/ccfam-ccmpa_e.htm

Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) 2004 http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2004/nr052_e.htm

Copes, Parzival, Emeritus Professor of Economics. 2000. Adverse impacts of individual quota systems on conservation and fish harvest productivity. Simon Fraser University, Institute of Fisheries Analysis Discussion Paper 00-2

Cummins, John, MP and BC Fisheries Survival Coalition. 2004. 2004 Fraser River Sockeye Escapement Crisis: Review of Possible and Probable Causes in Aid of a Judicial Inquiry.

DFO. 2004. Fisheries and Oceans Canada Mandate. http://www.dfo-mpo.gc.ca/dfo-mpo/mandat_e.htm

DFO. 2004. Standing Committee Reports and Government Responses (various dates and subjects, 1998-2004) http://www.dfo-mpo.gc.ca/communic/reports/index_e.htm

DFO. Audit and Evaluation Directorate. 2004. Audit of Environmental Compliance: January 2004. Prepared for DFO by Stratos Consultants, Ottawa. 33 pages.

DFO. 2004. Sustainable Development Strategy: Progress Report on the 2001-2003 Strategy. www.dfo-mpo.gc.ca/sds-sdd2004/index_e.htm

DFO. 2001. Sustainable Development Strategy 2001-2003: Building Awareness and Capacity: An Action Plan for Continued Sustainable Development 2001-2003. http://www.dfo-mpo.gc.ca/sds-sdd/index_e.htm

DFO. 2003. Review of the 2002 Fraser River Sockeye Fishery: Report by the External Steering Committee. http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/fisheriesmgmt/Report_e.htm

DFO. 2002. Canada's Oceans Strategy: Our Oceans, Our Future. http://www.cos-soc.gc.ca/

DFO. 2002. DFO's Aquaculture Policy Framework.http://www.dfo-mpo.gc.ca/aquaculture/policy/pg002_e.htm

Ecotrust and Ecotrust Canada. 2004. Catch-22: Conservation, Communities and the Privatization of B.C. Fisheries.

First Nations Panel on Fisheries. 2004. Our Place at the Table: First Nations in the B.C. Fishery. http://www.bcafc.org/aborig%20Fisheries%20report.pdf

Fraser, John. 1994. Fraser River Sockeye 1994: Problems and Discrepancies. Report of the Public Review Board. Ottawa: Public Works and Government Services Canada.

Fujita, Rodney M., Tira Foran and Ianthe Zevos. 1998. Innovative approaches for fostering conservation in marine fisheries. Ecological Applications 8(1) Supplement. pp. S139-150.

Gaertner, Brenda. 2004. The Scope of Section 35 Fishery Rights: a Legal Overview and Analysis. Prepared for the First Nations Panel on Fisheries. March 31,2004. www.bcafc.org/Gaertner.pdf

Glavin, Terry. 1986. Dead Reckoning: Confronting the Crisis in Pacific Fisheries. Vancouver: Greystone Books.

House Standing Committee on Fisheries and Oceans.1998. The West Coast Report. http://www.parl.gc.ca/InfoComDoc/36/1/FISH/Studies/Reports/fishrp04-e.htm

House Standing Committee on Fisheries and Oceans. 2004. 2004 Fraser River Sockeye Harvest: unedited transcript of the December 2-4, 2004 Vancouver Public Hearings (3 volumes).

House Standing Committee on Fisheries and Oceans. 2001. Report on the Oceans Act http://www.parl.gc.ca/InfoComDoc/37/1/FOPO/Studies/Reports/fopo01-e.htm

House Standing Committee on Public Accounts.1998. Fisheries and Oceans Canada –Pacific Salmon: Sustainability of the Resource Base. http://www.parl.gc.ca/InfoComDoc/36/1/PACC/Studies/Reports/Paccrp06-e.htm

Institute for Dispute Resolution (IDR). 2001. Independent Review of Improved Decision Making in the Pacific Salmon Fishery: Final Recommendations. Victoria: IDR.

Jones, Laura and Michael Walker, eds. 1997. Fish or Cut Bait: the Case for Individual Transferable Quotas in the Salmon Fishery of B.C. Vancouver: Fraser Institute.

Jones, Laura (with Miriam Bixby). 2003. Managing Fish: Ten Case Studies from Canada's Pacific Coast. Vancouver: Fraser Institute.

Kerr, Malcolm, November 2001 www.rarari.org.uk/bid79/home

Linstone, Harold A. and Murray Turoff, Editors © 2002, The Delphi Method: Techniques and Applications www.is.njit.edu/pubs/delphibook/index.html#toc

McRae, Donald M. and Peter H. Pearse. 2004. Treaties and Transition: Toward a Sustainable Fishery on Canada's Pacific Coast. http://www.bcafc.org/aborig%20Fisheries%20report.pdf

National Research Council, Committee to Review Individual Fishing Quotas, Ocean Studies Board, Commission on Geosciences, Environment, and Resources. 1999. Sharing the Fish: Toward a National Policy on Individual Fishing Quotas. Washington, D.C.: National Academy Press.

Nelson, Stuart and Bruce Turris. 2004. The Evolution of Commercial Salmon Fisheries in British Columbia. Report to the Pacific Fisheries Resource Conservation Council.

Office of the Auditor-General of Canada. 1997. "Fisheries and Oceans Canada – Pacific Salmon: Sustainability of the Resource Base." Chapter 28 in Report to Parliament. Ottawa: Minister of Supply and Services. http://www.oag-bvg.gc.ca/domino/reports.nsf/html/ch9728e.html

Office of the Auditor-General of Canada. 1999. "Fisheries and Oceans Canada – Pacific Salmon: Sustainability of the Resource Base." Chapter 20 in Report to Parliament. Ottawa: Minister of Supply and Services. http://www.oag-bvg.gc.ca/domino/reports.nsf/html/9920ce.html

Office of the Auditor-General of Canada. 2000. "The Effects of Salmon Farming in B.C. on the Management of Wild Salmon Stocks." Chapter 30 in Report to Parliament. Ottawa: Minister of Supply and Services. http://www.oag-bvg.gc.ca/domino/reports.nsf/html/0030ce.html

Office of the Commissioner for Aquaculture Development (OCAD). (Issued by DFO) 2003 and 2004. Achieving the Vision and Recommendations for Change; late 2003 and early 2004, respectively. http://ocad-bcda.gc.ca/egreetings.html

Pacific Fisheries Resource Conservation Council. Various dates and subjects, 1998-2004. Annual Reports, letters of concern, advisories and reports on various subjects. www.fish.bc.ca

Puget Sound Action Team. 2005. State of the Sound 2004. http://www.psat.wa.gov/Publications/StateSound2004/State_Sound_base.htm

Standing Senate Committee on Fisheries. 2001. Interim Report: Aquaculture in Canada's Atlantic and Pacific Regions. http://www.parl.gc.ca/37/1/parlbus/commbus/senate/com-e/fish-e/rep-e/repintjun01-e.htm

State of Minnesota. Department of Administration. 2004. Minnesota Milestones http://www.mnplan.state.us/mm/goal.html

UFAWU-CAW. 2004. A Fishery that Works for Everyone: an Alternative to McRae-Pearse – Treaties in Transition. Submitted by United Fishermen and Allied Workers' Union – CAW, November 2004.

Walters, Carl. 1995. Fish on the Line: the Future of Pacific Fisheries. David Suzuki Foundation.

8.4 Other References

Introductory note

This bibliography contains references that have been useful in preparing the report, but have not been specifically cited in the text or case studies. In some cases, these references themselves contain extensive useful references (e.g., BC Seafood Alliance, Jones and PFRCC entries). Wherever possible, we have provided Web references.

References

BC Seafood Alliance (multiple references) www.bcseafoodalliance.com. A number of pertinent reports have been issued by this organization in connection with its annual Seafood Summits. They are on the Alliance's Web site; they include:

- Davis, John (DFO). 2004. Overview of SARA and Fisheries Implications (PowerPoint presentation)
- Edwin Blewett and Associates. 2002. Status Report on Co-Managed Fisheries.
- James, Michelle.2003. Co-management and Beyond: the British Columbia Experience.
- Pearse, Peter H. 2002. Speaking Notes: New Directions in Fisheries Management: Co-Management and Beyond.

BC Sport Fishing Institute. 2004. Proceedings of 2004 Annual Conference. http://www.sportfishing.bc.ca/action_update/id25.htm (multiple references, including):

- Provincial Government Response to BC Auditor-General's Report. October 2004
- Crawford, William, Ph.D., Fisheries and Oceans Canada, Institute of Ocean Sciences, Pacific Region. Ocean Status Report, 2003 (with update for Nov 2004)

Clark, Doug and N. Doubleday.2003. Resilience Theory in Ocean Management: Finding New Bridges, Avoiding Barrier Reefs. Workshop Backgrounder for Ocean Management Research Network (OMRN) National Conference. http://www.maritimeawards.ca/OMRN/clark.html

DFO. (Fisheries and Oceans Canada). Departmental Assessment and Alignment Project (DAAP). Deals with financial stability, management practices. Links to April 2004 Final Report of the Project, and related PowerPoint presentation: http://ibew-fioe2228.ca/en/whatsnew/DFO/DAAP.htm

DFO. 2004. Fisheries and Oceans Canada Performance Report for the period ending March 31, 2003. Submitted to Treasury Board. http://www.tbs-sct.gc.ca/rma/dpr/02-03/FO-PO/FO-PO03D01_e.asp

DFO. 2004. Fisheries and Oceans Canada: 2004-2005 Estimates: a report on plans and priorities. www.tbs-sct.gc.ca/est-pre/20042005/FO-PO/pdf/FO-PO_e.pdf

DFO. 2004 Strategic Plan (the 2000 Strategic Plan is currently being revised).

DFO. 2004. Planning, Reporting and Accountability Structure (PRAS) (being prepared)

DFO. 2004. Sustainable Development Strategy (in preparation, to be tabled in Parliament in 2004-2005).

DFO. 2004. Expenditure and Management Review (in process, being led by Treasury Board Secretariat)

DFO. 2003. Fisheries and Oceans Canada Performance Report for the Period ending March 31, 2003 http://www.tbs-sct.gc.ca/rma/dpr/02-03/FO-PO/FO-PO03D01_e.asp

DFO. 2000. DFO Strategic Plan: Moving Forward with Confidence and Credibility.

DFO. 1996. Fisheries and Oceans Action Plan. Science and Technology for the New Century.

Gallaugher, Patricia and Laurie Wood, eds. 2004. Proceedings of the World Summit on Salmon, June 10-13, 2003. Burnaby: Simon Fraser University. www.sfu.ca/cstudies/science/summit.htm

Glavin, Terry. 2003. Protecting the Public Interest in the Conservation of Wild Salmon in British Columbia: A Strategy for the Conservation of Pacific Salmon. Sierra Club of British Columbia.

Glavin, Terry. 2004. "Wanted: New Management." Alternatives Journal 30:2, 20-23.

Government of British Columbia. 1997. The B.C. Fisheries Strategy: towards a Made-in-B.C. Vision to Renew the Pacific Salmon Fishery: Discussion Paper. May 1997.

Hilborn, Ray. 1992. "Institutional Learning and Spawning Channels for Sockeye Salmon." 49 Can. J. Fish Aquat. Sci. 1126-32.

Hume, Stephen. 2004. "Where have all the salmon gone? We don't call it poaching when commercial interests are at fault, so let's not launch into a logistically preposterous blame game about aboriginal bands." Vancouver Sun, Nov. 3, 2004.

Hutchings, J.A., C. Walters and R.L. Haedrich.1997. "Is scientific inquiry incompatible with government information control?" 54 Can. J. Fish Aquat. Sci. 1198-1201.

Inner Coast Natural Resource Centre.2003. Summary Report: Examining Best Practices in Coastal Zone Planning: Lessons and Applications for BC's Central Coast. www.sfu.ca/coastalstudies/linking/calendar.htm

Irvine, James R. and G. Alex Fraser. 2004. Canada's Wild Salmon Policy and the Maintenance of Biodiversity. (WFC Poster presentation).

Kenchington, Trevor. 1998. Canadian Fisheries Management in the Twenty-First Century. Submission to House of Commons Standing Committee on Fisheries and Oceans. (multiple chapters) http://home.istar.ca/~gadus/comm.html

Meggs, Geoff. 1991 (with a 1995 afterword). Salmon: the Decline of the BC Fishery. Vancouver: Douglas & McIntyre.

National Round Table on the Environment and the Economy (NRTEE). 1998. Sustainable Strategies for Oceans: a Co-Management Guide. Ottawa: NTREE. (Contains a number of useful case studies.) www.nrtee-trnee.ca/publications/PDF/Book_Oceans_E.pdf

Pearse, Peter H. 2002. New Directions in Fisheries Management: Co-Management and Beyond. Speaking notes for a presentation at the BC Seafood Alliance workshop "Sustainability through Co-Management," Vancouver: October 10, 2002.

Russell, Janet. 1997. Canadian Department of Fisheries and Oceans (DFO) Forum on fishery science in relation to fisheries management: a summary. Summary of a DFO-sponsored Public Forum in St. John's, Newfoundland entitled Fisheries Science in relation to Fisheries

Management (discussing concerns raised by Hutchings and Walters) http://naturalscience.com/ns/articles/01-10/ns_jr.html

Slaney, T.L., K.D. Hyatt, T.G. Northcote and R.J. Fielden. 1996. Status of anadromous salmon and trout in British Columbia and Yukon. Fisheries; special Issue on Southeastern Alaska and British Columbia salmonid stocks at risk. 21 (10):20-35.

Walters, C. 1997. Challenges in adaptive management of riparian and coastal ecosystems. Conserv. Ecol. 1(2):1. www.consecol.org/vol1/iss2/art1

World Fisheries Congress. 2004. Conference proceedings expected to be published in 2005; (conference papers and abstracts in authors' files)

8.5 Profiles of Delphi Panel Members

Tom Bird has served as the executive director of the Sport Fishing Institute of BC www.sportfishing.bc.ca and was a DFO biologist for 30 years. http://www.completeangler.net/destination15.html

Dennis Brown was vice-president of the UFAWU and later served as special advisor to the provincial government on fisheries policy. He also served as one of the Basin-wide Directors of the Fraser Basin Council.

John Cummins is Member of Parliament for Delta-Richmond East. He has been a member of the House of Commons Standing Committee on Fisheries and Oceans, and for a time served as opposition fisheries critic. http://www.parl.gc.ca/information/about/people/key/bio.asp?lang=E&query=75&s=M

Russ Jones is the director of the Haida Fisheries Program in Skidegate. He is one of the three panel members on the First Nations Panel on Fisheries, charged with articulating a vision of a viable post-treaty fishery. He also serves as a commissioner on the Pacific Salmon Commission www.psc.org and the North Pacific Anadramous Fish Commission. www.npafc.org As a fisheries consultant, he has worked, mainly with First Nations clients, on stock assessment, co-management, watershed restoration and marine protected area planning.

Paul Kariya is Executive Director of the Pacific Salmon Foundation. His professional career has included various positions within the Department of Indian Affairs and Northern Development, DFO, the BC Treaty Commission and Fisheries Renewal BC. His current position involves him deeply in the international aspects of BC salmon management.

David Lane is the Executive Director of the T. Buck Suzuki Environmental Foundation. www.bucksuzuki.org In that capacity he has been involved in the foundation's numerous habitat-related campaigns in many areas of the province.

Laurie MacBride is the Executive Director of the Georgia Strait Alliance. Her background is in public education, communications, advocacy and community stewardship. She has served on provincial environmental advisory committees and has been honoured with the BC Minister's Environmental Award. www.georgiastrait.org

Ron MacLeod, a former federal fisheries official, was involved in the creation and operation of the Salmonid Enhancement Program and received the Order of Canada in recognition of his numerous contributions to protecting Canada's fish resources over a 40-year period. http://www.sfsfishfirst.org/bb/article.asp?id=12

Marcel Shepert, based in Prince George, is currently the Executive Director of the Fraser River Aboriginal Fisheries Secretariat, and served as a fisheries program manager and coordinator for the Carrier Sekani Tribal Council between 1996 and 2002. He has been instrumental in building a strong First Nations team in the BC Interior. A member of PFRCC, he also sits on a number of boards including the Upper Fraser and Nechako Fisheries Council. He is one of the three panel members on the First Nations Panel on Fisheries.

8.6 Profiles of the Report Authors

David L. Peterson

Dave Peterson conducts investigative research on a variety of subjects. For the Pacific Fisheries Research Conservation Council (PFRCC), he co-authored a report entitled "Making Sense of the Salmon Aquaculture Debate" in 2003 (with Julia Gardner). For the same client, he prepared a report entitled "Making Sense of the Debate About Hatchery Impacts" in 2004 (with Allen Wood, Julia Gardner and Vicki Maloney.) These reports are available online at www.fish.bc.ca. Also in 2004, he prepared a background briefing paper on "Seismic Survey Operations: Impacts on Fish, Fisheries, Fishers and Aquaculture" for the BC Seafood Alliance's offshore oil and gas workshop.

Working with Devon Knight Events (www.devonknight.com), he has developed materials for the City of Coquitlam's watershed stewardship conference, BC Seafood Alliance's Co-Management Workshop, Englewood Packing Company's VIP open house, the BC Climate Change Economic Impacts Panel, and a number of land use and sustainability conferences and meetings. He holds graduate degrees from Harvard and the University of California.

Allen Wood

Al Wood is a Principal in North Vancouver-based Allen Wood Consulting, Inc. In 2004, he co-authored the PFRCC Hatchery Impacts report with Julia Gardner and Dave Peterson (see above). His 37-year career at DFO has given him a comprehensive understanding of fisheries issues. His experience there included positions as both a Chief and Management Biologist, in the Salmonid Enhancement Program, in the Northern Operations Branch, as Director of Program Planning and Economics in the Pacific Region, and with responsibility for dealing with First Nations, international treaty, and federal-provincial issues.

Since establishing Allen Wood Consulting in 1997, he has served a variety of clients in the fisheries field. He holds degrees in Zoology and Fisheries Management from UBC.

Dr. Julia Gardner

Dr. Gardner is a founding principal of Dovetail Consulting in Vancouver. www.dovetailconsulting.com. She co-authored the 2003 and 2004 Salmon Aquaculture and Hatchery Impacts reports for PFRCC (see above). Her current work focuses on land and marine resource planning for First Nations and marine protected area-related research and facilitation. She has assisted with recovery planning for endangered marine species, applying the new provisions of the Species at Risk (SARA) legislation. She has undertaken multiple projects for the Department of Fisheries and Oceans and Parks Canada in the areas of policy research and facilitation of multi-stakeholder and public consultation processes. Other recent clients include Weyerhaeuser Canada and the International Union for the Conservation of Nature (IUCN).

Dr. Gardner's degrees are in Geography, with a specialization in resource management. After completing her Ph.D. on coastal conservation in New Zealand she taught at McGill and UBC. She now serves as an adjunct professor at UBC.