HOUSE OF COMMONS
CANADA

THE FEDERAL ROLE IN AQUACULTURE IN CANADA

REPORT OF THE STANDING COMMITTEE ON FISHERIES AND OCEANS

Tom Wappel, M.P.
Chair

April 2003

Evidence of Committee public meetings is available on the Internet http://www.parl.gc.ca

Available from Communication Canada — Publishing, Ottawa, Canada K1A 0S9

THE FEDERAL ROLE IN AQUACULTURE IN CANADA

REPORT OF THE STANDING COMMITTEE ON FISHERIES AND OCEANS

Tom Wappel, M.P.
Chair

April 2003

STANDING COMMITTEE ON FISHERIES AND OCEANS

CHAIR

Tom Wappel

VICE-CHAIRS

Bill Matthews
Peter Stoffer

MEMBERS

Andy Burton
John Cummins
Rodger Cuzner
R. John Efford
Reed Elley
Georges Farrah
Loyola Hearn
Dominic LeBlanc
Joe Peschisolido
Carmen Provenzano
Yves Rocheleau
Jean-Yves Roy
Bob Wood

CLERK OF THE COMMITTEE

Jeremy LeBlanc

FROM THE RESEARCH BRANCH OF THE LIBRARY OF PARLIAMENT

Alan Nixon
François Côté
Lorie Srivastava

THE STANDING COMMITTEE ON FISHERIES AND OCEANS

has the honour to present its

THIRD REPORT

Pursuant to Standing Order 108(2), the Committee has studied aquaculture in Canada and is pleased to report as follows:

TABLE OF CONTENTS

INTRODUCTION

Terms of Reference

On 30 November 1999, the Standing Committee on Fisheries and Oceans agreed by unanimous consent to the following: “That the Standing Committee on Fisheries and Oceans undertake a comprehensive study of fin fish aquaculture commencing in January 2000.”

The Constitutional Distribution of Powers

Section 91 of the *Constitution Act*, *1867*, gives to the Parliament of Canada legislative authority over Seacoast and Inland Fisheries (12) and Navigation and Shipping (10).

The Mandate and Role of Fisheries and Oceans Canada

The Department of Fisheries and Oceans was established by the *Department of Fisheries and Oceans Act*, which assigns to the Minister of Fisheries and Oceans responsibility for all matters over which Parliament has jurisdiction and which is not assigned to any other department, board, or agency of the Government of Canada relating to:

- Sea coast and inland fisheries;
- Fishing and recreational harbours;
- Hydrography and marine sciences; and
- The coordination of the policies and programs of the Government of Canada respecting oceans.

Subsection 40(1) of the *Oceans Act* assigns to the Minister of Fisheries and Oceans responsibility for all matters over which Parliament has jurisdiction, and which is not assigned to any other department, board, or agency of the Government of Canada, relating to the policies and programs of the Government of Canada respecting oceans.

Under subsection 40(2) of the *Oceans Act* the Minister’s role is to encourage the activities necessary to foster understanding, management and sustainable development of oceans and marine resources and the provision of coast guard and hydrographic

services to ensure the facilitation of marine trade, commerce and safety in collaboration with other ministers of the Government of Canada.

Under the Department's definition of its mandate, Fisheries and Oceans Canada is responsible for policies and programs in support of Canada's economic, ecological and scientific interests in oceans and inland waters; for the conservation and sustainable utilization of Canada's fisheries resources in marine and inland waters; for leading and facilitating federal policies and program on oceans; and for safe effective and environmentally sound marine services responsive to the needs of Canadians in a global economy.

The mandate of Fisheries and Oceans Canada requires it to protect and conserve wild fish and their habitat. The main legislative authority for this is found in the *Fisheries Act*. Sections 35 and 36 prohibit the harmful alteration, disruption or destruction (HADD) of fish habitat and the deposition of deleterious substances into waters frequented by fish.

With respect to aquaculture, legislative and regulatory responsibilities of Fisheries and Oceans Canada include:

- prevention of the harmful alteration, disruption or destruction of fish habitat and a prohibition on the deposition of deleterious substances (delegated to Environment Canada)(*Fisheries Act*);

- authorizations to kill predators and operate acoustic deterrent devices (ADDs)(*Marine Mammal Regulations* and *Fishery (General) Regulations* (*Fisheries Act*));

- regulation of the importation of fish eggs into Canada and transfer across provincial boundaries (*Fish Health Protection Regulations* (*Fisheries Act*)); and

- authorization, through the Canadian Coast Guard, of aquaculture facility plans where the facility is located in navigable waters or if improvements to the facility could impede navigation (*Navigable Waters Protection Act*);

- management of the environmental assessment process (*Canadian Environmental Assessment Act*) protection when triggered by authorizations issued under HADD or the *Navigable Waters Protection Act*.

Background to the Study

> *The comparatively small size of our aquaculture industry is not commensurate with our potential, given that Canada has an abundance of natural resources ideally suited to the sector. In addition, Canadians have acquired internationally recognized technical and management expertise in the sector, and have developed state-of-the-art facilities for the production of high-quality cultured fish and seafood. Our geographic setting is also advantageous as we have easy access to the vast Pacific Rim and North American fish and seafood markets. If Canada can translate its significant advantages into industry growth, it has the potential to be a world leader in aquaculture.*
>
> *Federal Aquaculture Development Strategy, 1995*

Although Canada's aquaculture industry has grown steadily, thus far it has not been able to fulfil its potential for development. In Canada, the rationale for developing aquaculture has focused not on the security of the food supply but on its economic benefits.

Canadians in rural communities on both coasts have been hard hit by the decline of important commercial stocks, which has caused massive job loss in the harvesting and processing sectors, as well as the loss of export revenues. This has created a strong incentive to find other suitable activities to replace lost jobs and economic activity in coastal regions. Aquaculture is an obvious opportunity, and the federal government has designated aquaculture development as a priority, as specified in the 1995 *Federal Aquaculture Development Strategy* and more recently in *DFO's Aquaculture Policy Framework*, building on work begun in the seventies and eighties.

Nevertheless, not everyone supports the expansion of the aquaculture industry. Promoters of aquaculture, typically the private sector and the federal and provincial governments, are at odds with its critics, which include environmental groups, the traditional fish-harvesting sector and, on the West Coast, First Nations.

Despite recent federal policy initiatives, there is uncertainty about aquaculture's place in relation to other marine and freshwater activities. Aquaculture is sometimes described as "the new kid on the block" or even the "orphan" of marine activities. There is no federal aquaculture act nor are there federal aquaculture regulations. Although Fisheries and Oceans Canada (DFO) has been designated as the lead agency for aquaculture, responsibility for aquaculture is distributed among 17 federal departments and agencies.

In the fall of 1999, the Standing Committee on Fisheries and Oceans decided to undertake a study on aquaculture in Canada that would examine issues focusing on the role of the federal government, the regulatory environment, and the potential environmental and ecological challenges posed by an expanded industry. The Committee

began its hearings on aquaculture in Campbell River, British Columbia (B.C.) in February 2000 and concluded with hearings in May 2002 in Richmond, B.C. The Committee also held hearings in Nanaimo, Victoria, and Vancouver, B.C.; Bellingham, Washington State; St. Andrews, New Brunswick; Eastport, Maine; Eastern Passage, Nova Scotia; St Alban's, Newfoundland; and Ottawa. In total, the Committee heard from more than 60 individuals and groups, several on more than one occasion.

PART 1 — AQUACULTURE IN CANADA

Historical Development

There is anecdotal evidence that basic aquaculture was first practised in Canada by aboriginal peoples who transferred fish between streams and rivers. The earliest detailed records of planned aquaculture activity, however, date from 1857. They indicate that the first Superintendent of Fisheries in Lower Canada studied the incubation and hatching of Atlantic salmon and brook trout eggs. Shortly thereafter, in 1865, oyster production began in Prince Edward Island. The island government passed a statute providing for the leasing of specific areas for such an activity. By 1950, federal and provincial hatcheries were producing approximately 750 million freshwater fish and freshwater spawning fish annually for wild stock enhancement and non-commercial stock expansion.

Commercial aquaculture in Canada began in the 1970s, and has since expanded.[1] Aquaculture production takes place in all ten provinces and all three territories. Production varies widely across provinces; for instance, Manitoba has the lowest level of production (7 tonnes in 2000), while B.C. has the highest (56,440 tonnes in 2000). The predominant species raised in Canada are Atlantic salmon, rainbow trout, mussels, oyster, scallops, and clams. Other species such as Arctic char, tilapia, Atlantic cod, sea urchins, halibut, haddock, and sea cucumbers are in the developmental stages, or are raised in small quantities.

Regional Industry Development

Several factors have contributed to the growth of the Canadian industry, namely: (1) an increase in the overall demand for seafood, both domestically and in export markets; (2) declining populations of some wild stocks; (3) improvements in production and transportation techniques; and (4) proximity to the U.S. market.[2]

Aquaculture development varies across the country as a result of such factors as policy changes in different jurisdictions. For instance, in 1962, changes to the *Ontario Fish and Game Act* allowed the private sector to raise and sell rainbow and brook trout for

---

1 CyberNatural Software Group, University of Guelph, *Canada's Aquatic Environments: Aquaculture in Canada*, Accessed May 17, 2002, www.aquatic.uoguelph.ca/Human/Aquaculture/intro.htm.

2 The Standing Senate Committee on Fisheries, *Aquaculture in Canada's Atlantic and Pacific Regions*, Ottawa, June 2001, p. 5.

human consumption, and to commence stocking of smallmouth and largemouth bass. This set the stage for the beginning of commercial trout aquaculture in Ontario.[3]

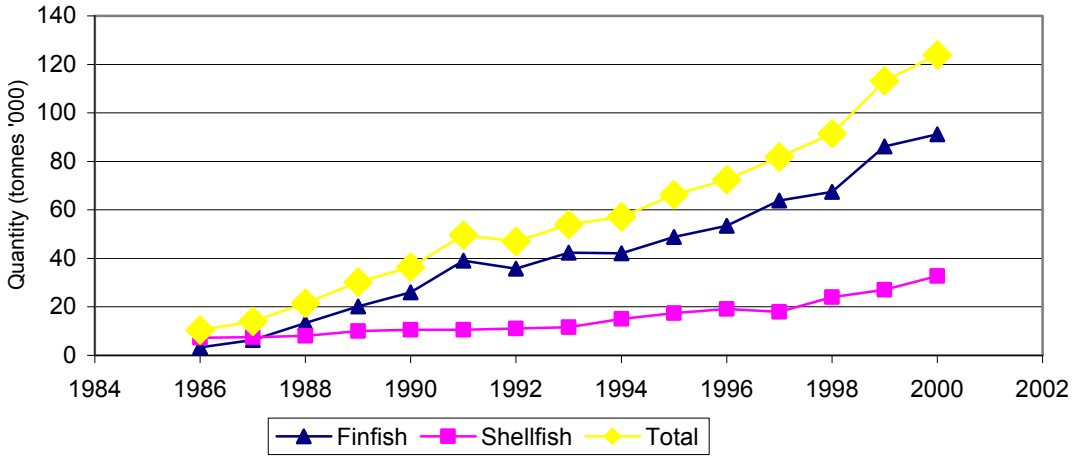
Mussel culture became established in the 1970s in Atlantic Canada. Prince Edward Island (P.E.I.) is now the province with the greatest mussel production; in 2000, it produced about 17,895 tonnes, or 84% of Canadian farmed mussels.[4]

Salmon aquaculture started in the late 1970s on the East Coast in the Bay of Fundy, between New Brunswick and Nova Scotia, and on the West Coast in B.C.'s Sechelt Inlet and Alberni Inlet. British Columbia has become the largest grower of commercial finfish, producing 49,500 tonnes in 2000 — 54% of total Canadian finfish production.

The growth of the Canadian aquaculture industry over the 15 years from 1986 to 2000 is illustrated in figures 1 and 2. As shown in Figure 1, production increased substantially during this period. Although shellfish production increased by 352%, finfish production, which grew by 2,700%, was the driving force behind overall aquaculture growth.

Figure 2 illustrates how the value of finfish and shellfish changed over the same period. Finfish sales were the main factor in the dramatic growth in total sales (1,642%). The value of shellfish rose 466%, while finfish value increased 2,060%.

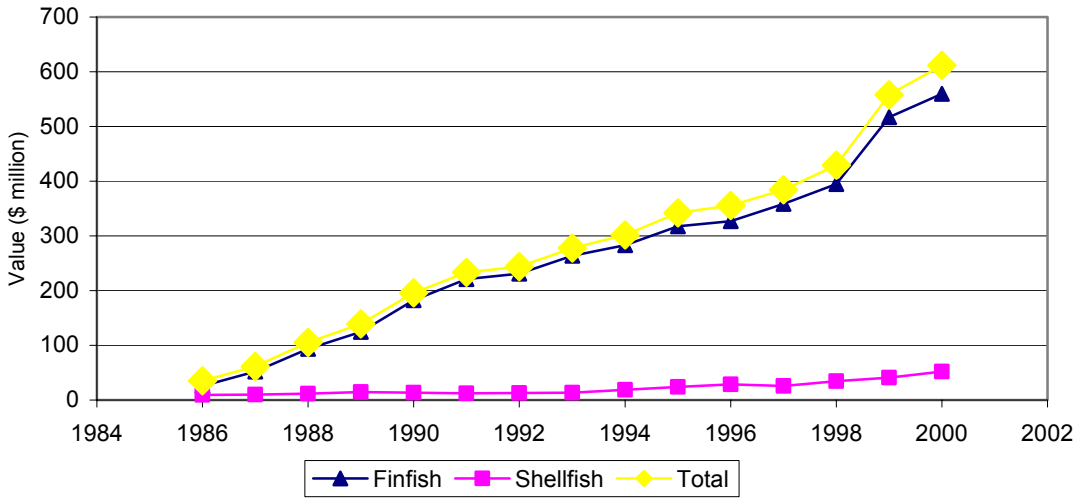
Figure 1: Canadian Aquaculture Production, 1986-2000



[3] Fisheries and Oceans Canada, Office of the Commissioner for Aquaculture Development, *Canadian Aquaculture Industry Profile*, September 25, 2002, ocad-bcda.gc.ca/eaquaculture.html.

[4] Canadian Aquaculture Industry Alliance, Homepage, Accessed May 17, 2002, www.aquaculture.ca/EnglishWeb.html.

Figure 2: Value of Canadian Aquaculture, 1986-2000



Industry Profile

Through the 1980s and early 1990s, as fish feed-manufacturing, applied scientific research, and industry infrastructure evolved, the industry expanded into every province.[5] In 2000, the Canadian aquaculture industry produced 91,195 tonnes of finfish and 32,729 tonnes of shellfish, for an aggregate total of 123,924 tonnes of seafood (Table 1). Finfish production accounts for about 74% of all aquaculture production in Canada, with salmon accounting for most of finfish production (86%). The bulk of all production takes place in British Columbia, which produces mostly salmon, followed by New Brunswick. Prince Edward Island is the third largest producer in terms of weight, though it primarily produces mussels.

[5] The Standing Senate Committee on Fisheries, *Aquaculture in Canada's Atlantic and Pacific Regions*, Ottawa, June 2001, p. 5.

Table 1: Canadian Aquaculture Production, 2000 (tonnes)

	NF	PEI	NS	NB	QC	ON	MB	SK	AB	BC	CANADA
FINFISH											
Salmon	670	x	3,425	25,000	-	-	-	-	-	49,400	78,495[2]
Trout	-	x	-	550	875	4,000	7	875	x	100	6,407[2]
Steelhead	842	-	4,681	-	-	-	-	-	-	-	5,523[2]
Other[1]											694[1]
Total Finfish[3]	**1,512**	**76**	**8,106**	**25,550**	**875**	**4,000**	**7**	**875**	x	**49,500**	**91,195**
SHELLFISH											
Clams	-	-	-	-	-	-	-	-	-	1,000	1,000
Oysters	-	2,731	773	620	-	-	-	-	-	5,900	10,024
Mussels	1,051	17,895	1,252	750	339	-	-	-	-	-	21,287[2]
Scallops	-	-	19	-	-	-	-	-	-	40	59[2]
Other	-	-	306	-	53	-	-	-	-	-	359
Total Shellfish	**1,051**	**20,626**	**2,350**	**1,370**	**392**	-	-	-	-	**6,940**	**32,729**
TOTAL	**2,563**	**20,702**	**10,456**	**26,920**	**1,267**	**4,000**	**7**	**875**	x	**56,440**	**123,924**

1: Includes char, other finfish and total Alberta finfish
2: Excludes confidential data
3: Excludes "Other" for provinces
- : Denotes zero value
x: Denotes data are unreported for reasons of confidentiality
Source: Statistics Canada — Cat. no. 23-603-UPE, Agriculture Division

The value of aquaculture production is given in Table 2. Overall, the value of all Canadian aquaculture production in 2000 was $611,572,000, up 9.6% from 1999; this was the slowest growth rate in the last three years. Statistics Canada speculates that one factor behind this slower growth could have been an increase in imports of farmed salmon into both Canada and the United States, combined with declining prices.

Largely based on its salmon production, British Columbia garnered the greatest proportion of this value ($281.7 million — 46%), with New Brunswick second ($190 million — 31%). Combined, these two provinces accounted for about 77% of total national sales in 2000. Sales in New Brunswick rose about 26% between 1999 and 2000 and are catching up to levels in British Columbia. Farmers in British Columbia recorded sales of $295.1 million, down about 2% during this period.

Table 2: Value of Canadian Aquaculture Production, 2000 ($ 000)

	NF	PEI	NS	NB	QC	ON	MB	SK	AB	BC	CANADA
FINFISH											
Salmon	4,962	x	18,893	190,000	-	-	-	-	-	281,700	495,555[2]
Trout	-	x	-	6,100	4,674	16,500	27	3,859	x	300	31,460[2]
Steelhead	5,494	-	19,395	-	-	-	-	-	-	-	24,889[2]
Other[1]											6,770[1]
Total Finfish[3]	**10,456**	**733**	**38,288**	**196,100**	**4,674**	**16,500**	**27**	**3,859**	x	**282,000**	**559,407**
SHELLFISH											
Clams	-	-	-	-	-	-	-	-	-	5,900	5,900
Oysters	-	6,324	1,891	1,700	-	-	-	-	-	7,000	16,915
Mussels	2,700	21,703	1,442	825	543	-	-	-	-	-	27,213[2]
Scallops	-	-	162	-	-	-	-	-	-	200	362[2]
Other	-	-	1,693	-	82	-	-	-	-	-	1,775
Total Shellfish	**2,700**	**28,027**	**5,188**	**2,525**	**625**	-	-	-	-	**13,100**	**52,165**
TOTAL	**13,156**	**28,760**	**43,476**	**198,625**	**5,299**	**16,500**	**27**	**3,859**	x	**295,100**	**611,572**

1: Includes char, other finfish and total Alberta finfish
2: Excludes confidential data
3: Excludes "Other" for provinces
- : Denotes zero value
x: Denotes data are unreported for reasons of confidentiality

Exports

Exports expanded substantially during the 1990s, as shown in Figure 3 and Figure 4. By 2000, the quantity of finfish exported was 144% higher than in 1992, while the quantity of shellfish exported was more than 700% higher than in 1992.

Figure 3: Canadian Aquaculture Exports — Finfish, 1992-2000

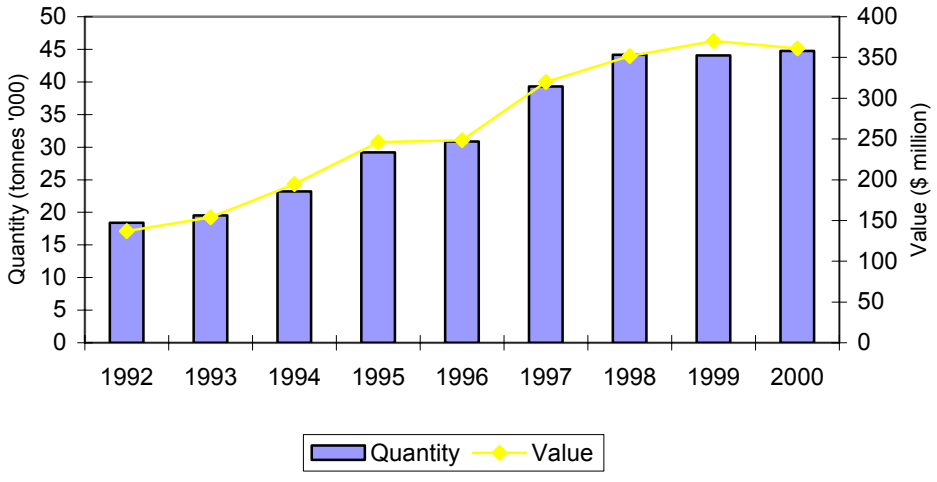
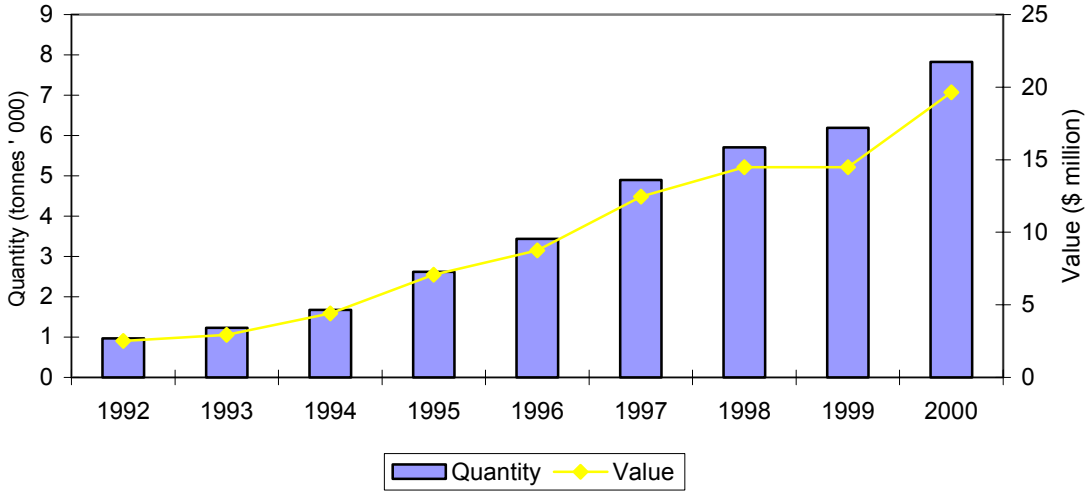


Figure 4: Canadian Aquaculture Exports — Shellfish, 1992-2000



In 2000, about 42% of aquaculture products were exported. According to Statistics Canada, the United States is Canada's top market for exports. Almost all Canadian finfish and shellfish exports are sold to states along the eastern and western coasts of the U.S., with France, Japan, and Taiwan taking the remainder. Table 3 gives the export data for 2000. The exported items are mussels, coho and chinook salmon, and Atlantic salmon; Atlantic salmon accounts for about 79% of the quantity exported.

Table 3: Exports of Selected Canadian Aquaculture Products, by Country, 2000

Destination	Mussels	Other Salmon[1]	Atlantic Salmon
		--- tonnes ----	
United States	7,760	2,978	40,515
California	310	1,164	8,642
Maine	3,068	-	796
Massachusetts	2,821	4	8,787
New York	586	14	3,309
Washington	9	1,283	14,509
Other	966	513	4,472
France	24	-	-
Japan	45	193	191
Taiwan	-	2	767
Other	-	-	127
Total	**7,829**	**3,173**	**41,600**
		--- '000 dollars ---	
United States	19,341	23,249	327,294
California	899	9,135	81,751
Maine	6,429	-	6,033
Massachusetts	7,524	28	68,276
New York	1,628	128	26,472
Washington	35	9,808	110,541
Other	2,826	4,150	34,221
France	97	-	-
Japan	201	1,890	1,557
Taiwan	-	14	6,208
Other	-	-	1,040
Total	**19,639**	**25,153**	**336,099**

Notes: (1) Includes coho and spring (chinook)
Source: International Trade Division, Statistics Canada

Employment

It is difficult to determine the number of full-time equivalent (FTE) jobs that are created by the aquaculture industry in Canada. According to the Canadian Aquaculture Industry Alliance, the production and supply and service sectors account for 7,000-8,000 direct and indirect jobs. Rough estimates by Statistics Canada, however, indicate that the number of full-time equivalent jobs in medium and large aquaculture operations was 3,850 in 2000. Comparable information for small operators is not recorded, and hence is unavailable. Estimates of indirect jobs are difficult to ascertain, and are unverified.

Projected Growth

In 1995, the *Federal Aquaculture Development Strategy* projected, given certain critical success factors, that the total farm-gate value of Canadian aquaculture could

reach $680 million by the year 2000 and employ in excess of 8,000 people directly in production and a further 4,000 in services to the industry. In total, the aquaculture sector could generate more than $1.2 billion annually, half of which would come from export sales.[6] Those expectations have been essentially fulfilled. Sales of products and services in 2000 amounted to $674 million. DFO's *Aquaculture Policy Framework* reports that the sector currently employs in excess of 14,000 people and approaches $1 billion in direct and indirect economic activity.[7]

What is the potential for growth of Canada's aquaculture industry? The Framework observes that, "despite its numerous positive attributes, Canada's contribution to global aquaculture remains small and static at 0.2%." Most major traditional capture fisheries around the world have already reached or exceeded maximum sustainable harvest rates. If per capita consumption of fish is to keep pace with population growth, aquaculture production will have to meet the growing gap between traditional fisheries production and demand. The FAO predicts that by the year 2030, aquaculture will dominate fish supplies and less than half the fish consumed will originate from traditional fisheries.[8] Capitalizing on even a small fraction of this demand could mean a significant growth opportunity for the Canadian aquaculture industry.

Both government and industry sources envisage significant growth in the Canadian aquaculture sector. *DFO's Aquaculture Policy Framework* projects that, based on current trends and Canada's significant aquaculture development potential, the aquaculture sector could contribute $3 billion annually to the Canadian economy by 2010. The Canadian Aquaculture Industry Alliance conservatively estimates that the industry could grow to a farm-gate value of $2.5 billion in the same timeframe.[9]

A study commissioned by Western Economic Diversification Canada concluded that marine finfish farming has the potential to contribute $1 billion annually to the economy of British Columbia alone, resulting in the creation of 20,000 FTE jobs (direct, indirect and induced) by the year 2010.[10] Shellfish farming, according to the same study, has the potential to become a $100-million industry and create 1,000 person years of employment.[11]

---

6 Fisheries and Oceans Canada, Communications Directorate, *Federal Aquaculture Development Strategy*, Ottawa, 1995, p. 6.

7 Fisheries and Oceans Canada, Communications Branch, *DFO's Aquaculture Policy Framework*, May 2002, p. 12.

8 UN Food and Agriculture Organization, *The State of World Fisheries and Aquaculture 2000*, Part 4, Outlook, www.fao.org/DOCREP/003/X8002E/x8002e07.htm#P1.

9 Canadian Aquaculture Industry Alliance, Brief to the Committee, October 30, 2001.

10 Western Economic Diversification Canada, Economic Potential of the British Columbia Aquaculture Industry, Phase II — Fin Fish, undated, p. i.

11 Western Economic Diversification Canada, Economic Potential of the British Columbia Aquaculture Industry, Phase I — Shellfish, undated, p. i.

When the B.C. government announced on January 31, 2002, that it would lift the moratorium on the expansion of salmon farming in the province, the BC Salmon Farmers Association responded that salmon farmers were prepared to invest $50 to $60 million dollars a year over the next 10 years and that the industry intended to grow at a rate of 10 new farms per year, doubling the number of existing farms in a decade. The goal is to build an industry that will generate $2.4 billion in economic activity every year and create 8,000 new full-time jobs, mostly in coastal areas of the province, within a decade.

Although there are differences between the various projections, taken together they indicate that both government and industry anticipate an expansion of the Canadian aquaculture sector of approximately 100-200% over the next decade. Such growth, if duplicated on both coasts, suggests that either substantially new areas will have to be opened up for aquaculture development, or farm densities will increase markedly in already established areas.

Recent Initiatives

A great deal has transpired since the Committee began its study. A number of the more important initiatives are summarized below.

1999 British Columbia Salmon Farm Siting Policy

In October 1999, the B.C. Provincial Government announced a new Salmon Aquaculture Policy[12] in which it made a commitment to implementing the siting criteria recommended in the Salmon Aquaculture Review (SAR). One of the elements of the policy was a two-year action plan to relocate poorly sited operations to new areas where they would meet environmental standards and enjoy community support. At the time, the Policy retained the moratorium on the expansion of stand-alone conventional salmon tenures; the B.C. government announced, however, that it would offer five new freshwater and five new salt water tenures which would pair conventional and closed-containment technologies as an incentive to develop closed-containment systems.

2000 Program for Sustainable Aquaculture in Canada

On August 8, 2000, the Minister of Fisheries and Oceans at that time, Herb Dhaliwal, announced an investment of $75 million in new funding over the following five years to enhance the sustainable development of Canada's aquaculture industry. This investment was aimed at strengthening the ties among different levels of government, the scientific and academic communities, and the industry to ensure the development of a diverse and competitive industry.

---

[12] B.C. Ministry of Fisheries, *News Release*, "Streifel, Sawicki Announce Salmon Aquaculture Policy," October 18, 1999.

The Program for Sustainable Aquaculture in Canada was designed to provide the industry and government with opportunities to conduct leading-edge research and development, strengthen measures to protect human health through an enhanced shellfish water quality monitoring program, and implement legislative and regulatory reform for the industry.

2000 New Brunswick Bay of Fundy Marine Aquaculture Site Allocation Policy

In October 2000, the Government of New Brunswick released its Bay of Fundy Marine Aquaculture Site Allocation Policy. The Policy, which applies to the Bay of Fundy only, addresses the allocation of sites for Atlantic salmon, alternative finfish, shellfish, lobster ponds and other activities, including the culture of echinoderms and marine plants.

2002 British Columbia Salmon Aquaculture Policy

On January 31, 2002, the B.C. government announced that it was ending the moratorium on salmon farming, and that new, comprehensive environmental standards and practices that would allow for the managed expansion of the salmon aquaculture industry in British Columbia, would begin April 30, 2002. The announcement noted that applications for new aquaculture sites would be accepted after April 30, 2002.[13] The plan included an aquaculture waste control regulation that entered into force on September 12, 2002. A new aquaculture regulation focused on preventing escapes was approved and ordered on April 19, 2002.

2002 DFO Aquaculture Policy Framework

In May 2002, Fisheries and Oceans Canada released its *Aquaculture Policy Framework*. The policy is the Department's response to the 1995 *Federal Aquaculture Development Strategy*. In the document, DFO states that, as the lead federal agency for aquaculture development, DFO is "committed to creating policy conditions that increase both the public's confidence that aquaculture is being developed in a sustainable manner and the aquaculture industry's competitiveness in global markets."[14]

2002 Quebec Draft Bill on Aquaculture

In the summer of 2002, the government of Quebec submitted a draft bill respecting commercial aquaculture. The Committee on Agriculture, Fisheries and Food of Quebec's National Assembly was holding hearings on the matter in the fall of 2002. The object of

---

[13] B.C. Ministry of Agriculture, Food and Fisheries, *Press Release*, "New standards to be set for sustainable aquaculture," NR 02-01, January 31, 2002.

[14] Fisheries and Oceans Canada (2002), *DFO's Aquaculture Policy Framework*, p. 3.

this draft bill is to provide a framework for aquaculture carried on for commercial purposes, for research or experimentation purposes, and for the operation of fishing ponds. The province wants to ensure the orderly development of the industry in part with a licensing system under which the issuance of licences will be subject to certain authorizations provided for in the provincial *Environment Quality Act* and the *Act Respecting the Conservation and Development of Wildlife.*

Studies on Aquaculture

A great deal has been written about aquaculture in Canada in the recent past, some of it critical, especially where it concerns the farming of Atlantic salmon. The following are some of the major studies.

The 1997 Salmon Aquaculture Review

In 1995, the B.C. Environmental Assessment Office initiated a comprehensive review to determine the environmental risks associated with salmon farming and to recommend methods to mitigate those risks and better manage the fishery. The *Salmon Aquaculture Review* (SAR) report, 1,800 pages in total, was released in 1997. The SAR found that the industry, as it was then configured, posed a minimal risk to the environment. Nevertheless, the SAR identified concerns related to:

- inadequate environmental standards and enforcement mechanisms;
- the lack of a legal framework to set and enforce escape prevention or recapture requirements;
- poor siting of a number of existing operations; and,
- the lack of incentives to develop and adopt new environmental technologies.

The 49 recommendations of the report were accepted by the B.C. government, which subsequently released a new aquaculture policy in October 1999. According to the B.C. Ministry of Agriculture, Food and Fisheries (MAFF), a majority of the recommendations have been either fully or partially implemented.[15] The Salmon Aquaculture Implementation Advisory Committee was established in 1999 to bring together major stakeholder groups to help in the implementation of regulations, policy development and the strategic development of the aquaculture industry in B.C.

[15] B.C. Ministry of Agriculture, Food and Fisheries, Backgrounder, "B.C. Salmon Aquaculture Policy," MAFF #02-01, January 31, 2002, p. 6. According to the backgrounder, 23 recommendations have been fully implemented while 16 have been partially implemented.

The SAR report has since been held up by the salmon farming industry as evidence of the minor environmental effects of salmon farming. Critics have responded, however, that the SAR addressed the industry in its current state, and not the potential effects should it expand. Critics have also observed that the SAR was primarily a "paper study" and that much of the literature reviewed did not apply to the B.C. coast.

December 2000 Report of the Auditor General of Canada

In Chapter 30 of the December 2000 Report to Parliament, *The Effects of Salmon Farming in British Columbia on the Management of Wild Salmon*, the Auditor General of Canada (AG) found that DFO was not fully meeting its responsibilities to conserve and protect fish under the *Fisheries Act*. The AG's report found deficiencies in a number of areas, including:

- monitoring of the effects of salmon farms on fish and fish habitat;
- determining how to apply the *Fisheries Act* to protect fish habitat from the effects of salmon farming;
- planning for risk management in the event of industry expansion;
- scientific information on the risks of disease transfer between wild and farmed salmon; and,
- monitoring of escaped farm salmon.

2001 Report of the Aquaculture Commissioner

On May 8, 2001, the Aquaculture Commissioner released a report on the first phase of his legislative and regulatory review. The report, entitled *Legislative and Regulatory Review of Aquaculture in Canada*, contained 36 recommendations on measures that the Commissioner "considered urgent."

The Commissioner identified four key requirements fundamental to the development of a renewed federal framework for aquaculture:

- a clear definition of aquaculture;
- operational stability for aquaculturists;
- the use of risk management approaches; and
- a clear federal development mandate for aquaculture.

The Commissioner advised that the development and implementation of a renewed legal framework for aquaculture be divided into three components. Two of these components would be undertaken in the short term: (1) a series of "priority initiatives" and (2) a harmonization process in cooperation and agreement with the provinces and territories, (3) substantive legislative changes would be undertaken in the longer term.

2001 Report of the Standing Senate Committee on Fisheries

A June 2001 Report by the Standing Senate Committee on Fisheries, *Aquaculture in Canada's Atlantic and Pacific Regions*, also sounded several notes of caution. Among other things, it asked the Auditor General of Canada to conduct a comprehensive audit in the Atlantic region, similar to that conducted the previous year in the Pacific region. It recommended that the Department give due consideration to its legislative mandate for the protection of wild fish and their habitat when responding to recommendations made by the Commissioner for Aquaculture Development. It also asked the federal government to invest more research resources in the area of the environmental, ecological and human health effects of aquaculture.

November 2001 Leggatt Inquiry Into Salmon Farming in British Columbia

The Leggatt Inquiry Into Salmon Farming in British Columbia, sponsored by the David Suzuki Foundation and boycotted by the B.C. government, the federal government and the aquaculture industry, released its report *Clear Choices, Clean Waters* in November 2001. Among other things, the report recommended: an end to (open) net cage salmon farming by 2005; removing all responsibility for the promotion of salmon farming from Fisheries and Oceans Canada; and maintaining the then current moratorium on the expansion of salmon farming in the province.

November 2002 and January 2003 Pacific Fisheries Resource Conservation Council Advisories

Following a dramatic decrease in the number of pink salmon returning to spawn in the Broughton Archipelago area in the summer of 2002, the Pacific Fisheries Resource Conservation Council (PFRCC) issued an advisory in November 2002, raising concerns over the potential impact of salmon aquaculture and sea lice.[16] The PFRCC recommended, in the advisory, that the governments of Canada and British Columbia undertake urgent actions to maximize the safe passage of fish through the Broughton Archipelago during April 2003.

---

[16] Pacific Fisheries Resource Conservation Council, *2002 Advisory: the Protection of Broughton Archipelago Pink Salmon Stocks*, Report to the Minister of Fisheries and Oceans Canada and the Minister of Agriculture, Food and Fisheries of British Columbia, November 2002.

In January 2003, the PFRCC issued another advisory outlining measures the Council believed should be taken to deal with risks to wild salmon stocks, the management of the fisheries and aquaculture industry, and public perceptions of a "confused and contradictory government role in the regulation and encouragement of aquaculture and the protection of wild salmon."[17] The advisory urged a more rigorous application of the precautionary principle; more research into the interaction between wild and farmed salmon; a comprehensive policy giving priority to wild salmon in government decision-making; the integration of government supervision and regulation of wild and farmed salmon into single bay or area management units; and the creation of a Salmon Aquaculture Forum, to build public consensus about the future direction of the industry and to find ways of reducing the risks to wild salmon.

The second advisory was based in part on a report entitled *Making Sense of the Salmon Aquaculture Debate: Analysis of issues related to netcage salmon farming and wild salmon in British Columbia*, commissioned by the Council in August 2002 and released in January 2003.

[17] Pacific Fisheries Resource Conservation Council, *Advisory: Wild Salmon and Aquaculture in British Columbia*, Report to the Minister of Fisheries and Oceans Canada, to the Minister of Agriculture, Food and Fisheries of British Columbia, and to the Canadian public, January 2003.

PART 2 — KEY ISSUES AND RECOMMENDATIONS

The Federal Role in Aquaculture

Current Legislative and Regulatory Environment

One of the major factors affecting the management and development of aquaculture in Canada is the complex legislative and regulatory environment that governs the practice of aquaculture in this country. The federal government has several key areas of responsibility affecting aquaculture that are summarized in Table 4.

Table 4: Federal departments and agencies with significant responsibilities for aquaculture

Responsible Agency	Statute or Regulation	Area of Responsibility
Fisheries and Oceans	*Fisheries Act*	Prevention of the harmful alteration, disruption or destruction (HADD) of fish habitat
		Prohibition on the deposition of deleterious substances (delegated to Environment Canada)
	Marine Mammal Regulations and *Fishery (General) Regulations* (*Fisheries Act*)	Authorizations to kill predators and operate acoustic deterrent devices (ADDs)
	Fish Health Protection Regulations (*Fisheries Act*)	Regulation of the importation of fish eggs into Canada and transfer across provincial boundaries
Canadian Coast Guard (DFO)	*Navigable Waters Protection Act*	Approval of salmon farm plans if the farm is located in navigable waters or if improvements to a farm could impede navigation
Canadian Food Inspection Agency (Agriculture and Agri-food Canada)	*Fish Inspection Act*	Product and process standards contributing to acceptable quality, safety and identity of fish and seafood products, and assurance of compliance with standards
	Health of Animals Act	Importation of veterinary biologics
	Feeds Act	Assurance of safety, effectiveness and correct labeling of livestock feeds, including medicated feeds
Veterinary Drugs Directorate (Health Canada)	*Food and Drugs Act*	Safety of foods for human consumption from animal sources, including fish treated with veterinary drugs.
		Safety and effectiveness for animals of veterinary drugs sold in Canada
Pest Management Regulatory Agency (Health Canada)	*Pest Control Products Act*	Registration of pest control products in Canada
Canadian Environmental Assessment Agency	*Canadian Environmental Assessment Act*	Require an environmental assessment where triggered by the *Navigable Waters Protection Act* (section 5) or the *Fisheries Act* (section 35)

Sections 34, 35 and 36 of the *Fisheries Act* prohibit the harmful alteration, disruption or destruction (HADD) of fish habitat and prohibit the deposition of deleterious substances. Canadian Coast Guard approval is required for an aquaculture facility under section 5 of the *Navigable Waters Protection Act* (NWPA) if it is located in navigable waters. Approval of aquaculture tenures under NWPA or HADD may trigger an environmental assessment under the *Canadian Environmental Assessment Act*.

For the majority (8 of 13) provinces and territories,[18] the respective roles and responsibilities of the federal government and provincial and territorial governments are set out in a series of bilateral Memoranda of Understanding (MOUs) on aquaculture development.[19] These memoranda are intended to delineate responsibility, avoid duplication and improve support for the industry. Under the terms of the MOUs, federal responsibilities include: fish health and inspection; the protection of fish habitat; and scientific research. Provincial and territorial responsibilities include promotion, development and regulation of the industry. They generally have responsibility for licensing and leasing, except for Prince Edward Island, where the federal government retains that responsibility.

A Federal Aquaculture Act

While most provinces, including all of the coastal provinces, have aquaculture statutes and/or regulations,[20] there is no federal aquaculture act and there are no federal statutes or regulations that specifically address aquaculture. The lack of a federal aquaculture act and federal aquaculture regulations causes problems for both aquaculture operators and other stakeholders. Aquaculture, as an emerging marine industry, must compete for legitimacy with established marine and aquatic sectors such as the capture fishery and marine transportation. Responsibilities for regulations affecting aquaculture are distributed among numerous federal departments and agencies, and those regulations were often designed with activities other than aquaculture in mind.

Aquaculture is not a fishery in the traditional sense. In reality, it is more akin to the farming of livestock, and as such it requires a legislative and regulatory framework that addresses the needs and particular circumstances of the industry. The legitimacy and rights of the aquaculture industry, which have been strongly supported by the federal

---

[18] With the exception of Ontario, Alberta, Saskatchewan, Manitoba and Nunavut.

[19] The MOUs were signed between 1987 (Northwest Territories and P.E.I.) and 1995 (Nova Scotia). The federal government and Nova Scotia renewed their MOU on aquaculture development on June 18, 2002.

[20] British Columbia, *Fisheries Act*, *Aquaculture Regulations*; New Brunswick, *Aquaculture Act*, *Aquaculture Regulations*; Nova Scotia, *Fisheries and Coastal Resources Act*, *Aquaculture Licence and Lease Regulations*, *Fisheries and Aquaculture Loan Regulations*; Newfoundland and Labrador, *Aquaculture Act*, *Aquaculture Regulations*; Prince Edward Island, *Fisheries Act*; Quebec, *An Act Respecting Commercial Fisheries and Aquaculture*, *Commercial Aquaculture Regulations*; Ontario, *Fish and Wildlife Conservation Act*, O. Reg. 664/98 Nunavut, no; Manitoba, no; Saskatchewan, *Fisheries Act*, *Pt VIII of Fisheries Regulations*; Yukon, no; Alberta, *Fisheries (Alberta) Act*, *General Fisheries (Alberta) Regulation*, *Fisheries (Ministerial) Regulation*; Northwest Territories, no.

government, need to be established not just in policy but also in law. At the same time, the responsibilities of aquaculture operators must be set out unambiguously so that there are clear standards to which they will be held accountable.

The *Oceans Act*, which came into force in January 1997, provides the legislative foundation for the Oceans Management Strategy. The Strategy is based on three key principles: sustainable development; integrated management of activities; and the precautionary approach. According to some witnesses, these principles are not being respected with respect to aquaculture. There is the view, on the one hand, that salmon farming is not being practised sustainably and that the precautionary approach has not been applied to the development of netcage salmon aquaculture. On the other hand, we also heard concern expressed that opponents of the industry would use the "precautionary approach" as a means to hinder legitimate development of aquaculture by insisting on assurances of zero risk. The Committee believes that clear definitions of "sustainable development" and the "precautionary approach" (or precautionary principle) as they apply to aquaculture would help to resolve any such debate.

The Committee therefore recommends:

RECOMMENDATION 1

That the federal government enact a federal Aquaculture Act that will:

- **recognize in law aquaculture as a legitimate user of aquatic resources;**
- **provide a legal definition of aquaculture;**
- **set out the rights and obligations of fish farm operators;**
- **recognize that aquaculture is not a fishery *per se* but is a form of animal husbandry;**
- **provide the legal basis for an appropriate policy framework;**
- **adopt a definition of "sustainable development" as follows:**

  Development that meets the needs of the present without compromising the ability of future generations to meet their own needs;[21]

[21] This is the definition adopted in the *Oceans Act*, the *Auditor General Act*, the *Canadian Environmental Protection Act* and by the World Commission on Environment and Development (Brundtland Report).

- **adopt a definition of the "precautionary principle" as follows:**

  Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation;[22]

- **strive to consolidate statutes governing aquaculture so as to avoid duplication and unnecessary bureaucracy; and**

- **provide regulation-making powers to consolidate and streamline regulations applicable to aquaculture within a comprehensive set of federal aquaculture regulations.**

Federal Aquaculture Regulations (general principles)

As regulations give practical expression to laws, it is equally important that the federal government undertake to develop aquaculture regulations under a new federal Aquaculture Act within a reasonable timeframe. As aquaculture has emerged as a significant economic activity in Canada only in the last two decades, much of the existing regulatory framework is not well suited to this sector. Current federal regulations applicable to aquaculture are scattered throughout federal statutes and, the Committee was told, are sometimes applied inconsistently in different regions of the country. With respect to one of the most significant issues relating to aquatic resource use, the protection of fish habitat and the discharge of wastes, there are no federal regulations governing aquaculture.

This situation causes uncertainty and confusion for aquaculture operators and may be hindering the responsible development of the industry. It also causes frustration for other stakeholders in marine and freshwater aquatic environments who perceive inconsistent or even non-existent monitoring and enforcement of rules and standards for the aquaculture industry.

The Committee recommends:

RECOMMENDATION 2

That regulations be developed pursuant to a federal Aquaculture Act that will:

- **provide a clear set of standards for operators, other stakeholders and the public;**

[22] This is the definition adopted in the *Canadian Environmental Protection Act* and by the 1992 United Nations Conference on Environment and Development (The Rio Declaration).

- **ensure transparency, consistency and public accountability of all regulatory processes;**

- **ensure consistent application of high national standards for aquaculture across Canada; and**

- **provide long-term stability to the industry and encourage responsible and sustainable growth of the industry.**

The Committee heard from numerous witnesses that current regulations are not being enforced. Regulations, however, have little value if they are not enforced. In order to determine whether operators are in compliance, DFO must improve its monitoring of fish farm facilities and provide the necessary human and financial resources to get the job done. The Committee believes that ensuring that operators are performing according to high national standards will benefit the industry as a whole and improve public perception of the industry.

The Committee recommends:

RECOMMENDATION 3

That Fisheries and Oceans Canada allocate the necessary financial and human resources to ensure compliance of marine fish farm operations with federal environmental regulations; and, where provincial and territorial regulations exist, that DFO work with the provinces and territories to ensure that their standards, monitoring and enforcement are fully consistent with federal standards. In order to help fund these activities, DFO should establish cost-sharing mechanisms with the industry on the basis that it is being granted access to a public resource.

In the aquaculture industry, as in any other, there will sometimes be irresponsible operators and others motivated by short-term profit. When the problems caused by such operators are exposed in the media, there is a tendency for the whole industry to be perceived as being at fault, to the detriment of the majority of competent and ethical fish farmers.

According to the Canadian Aquaculture Industry Alliance, the industry itself is not well equipped to discipline poor operators. The federal government has a role in ensuring that aquaculture operations comply with federal regulations and guidelines.

The Committee recommends:

RECOMMENDATION 4

That the federal government establish a mechanism to ensure that sanctions are imposed on aquaculture operators who are not in compliance with federal regulations. Such a mechanism should include "whistle blower" protection for industry and government employees.

DFO's Aquaculture Policy Framework emphasizes the Department's commitment to creating policy conditions that increase both the public's confidence that aquaculture is being developed in a sustainable manner and the industry's competitiveness in global markets. Environmental sustainability is in the interest of both society and the aquaculture industry. Nevertheless, it is essential not only that the industry be environmentally sustainable but that this fact be communicated to the Canadian public. One means to this end would be for the federal government to promote, and for the industry to adopt, an internationally recognized system of environmental management such as the ISO 14001 Standard.[23] Not only would this help to assure the public and other stakeholders of the industry's commitment to the highest standard of environmental performance, but accreditation to ISO 14001 could also prove to be a useful marketing tool in a very competitive global marketplace.

The Committee recommends:

RECOMMENDATION 5

That the federal government promote a system of continual environmental improvement for aquaculture, such as the ISO 14001 standard and that Canada advocate such a system internationally to create a more "level playing field."

Jurisdiction and Enforcement

DFO has a legislated mandate to protect fish and fish habitat, which it must uphold even where there are administrative arrangements that delegate these responsibilities to the provinces. Much of the criticism levelled at the aquaculture industry stems from the belief that the federal government, through Fisheries and Oceans Canada and Environment Canada, has not been fully meeting its responsibility to protect wild fish stocks and the environment from the potentially harmful effects of fish farming. This

[23] The International Standards Organization (ISO) 14001 Standard requires an organization to monitor and measure the environmental performance of its activities, products and services in order to continually improve such performance.

situation serves neither the public interest nor that of the aquaculture industry. DFO must acknowledge its responsibility under the *Fisheries Act* to protect wild fish stocks and their habitat.

The Committee recommends:

RECOMMENDATION 6

That the provisions of the *Fisheries Act*, the *Navigable Waters Protection Act* and the *Canadian Environmental Protection Act* be applied to all existing and future aquaculture facilities; and

That DFO fulfill its responsibility to safeguard wild fish stocks and marine resources by acting as the public watchdog of both the aquaculture and commercial fishing industries.

Clarification of Roles and Responsibilities of Federal and Provincial Governments

Although the respective roles and responsibilities of the federal government and provincial and territorial governments are set out in the series of bilateral Memoranda of Understanding on aquaculture development, it appears that there is often confusion as to which level of government is responsible for what. There is also frequent overlap between federal and provincial responsibilities — for example, British Columbia has developed its own waste management regulations. *DFO's Aquaculture Policy Framework* seeks to improve the aquaculture industry's competitiveness in global markets even though, under the terms of the MOUs on aquaculture development, it is the provinces/territories that are responsible for promotion and development of the industry and it is the federal government's responsibility to protect fish and fish habitat.[24]

In a submission to the Committee, the Sierra Legal Defence Fund presented arguments that "current aquaculture practices in British Columbia can be demonstrated to be illegal based upon Constitutional law, domestic and international law." Specifically, the Sierra Legal Defence Fund argued that regulation of aquaculture wastes is beyond the legislative competence of the Province of British Columbia, as, based on the Defence Fund's legal analysis, the federal government has exclusive jurisdiction over marine pollution.

The Sierra Legal Defence Fund has forwarded its brief to the Attorney General of Canada and has called upon the Attorney General to institute legal action to halt the proposed expansion of the fish farming industry in British Columbia.

---

[24] Fisheries and Oceans Canada, Intergovernmental Affairs, *Summary of MOUs signed with the coastal provinces*, received February 19, 2002.

While the Committee has not rendered a specific recommendation on the submission made by the Sierra Legal Defence Fund, it has taken note of its contents and of their potentially serious implications. Nevertheless, the submission highlights a fundamental issue of jurisdiction with respect to aquaculture. The Committee fears that DFO may be ceding federal constitutional jurisdiction to the provinces, and therefore believes that clarification of the respective legislative responsibilities and obligations of the two senior levels of government is of the utmost importance.

The Committee recommends:

RECOMMENDATION 7

That DFO assert federal constitutional authority over the protection of fish and fish habitat;

That the federal government negotiate with the provinces and territories over areas of shared jurisdiction to ensure that the regulatory roles, responsibilities and accountability of both levels of government be made clear; and

That in the absence of agreement with the provinces and territories within a reasonable timeframe, DFO urge the Governor in Council to seek a reference to the Supreme Court of Canada under section 53 of the *Supreme Court Act*.

Not only is the industry evolving rapidly but it is also at varying stages of development in different regions of the country. What may have been an appropriate understanding between federal, provincial and territorial governments at one point in time will almost certainly change as requirements, circumstances and capacities change.

The Committee recommends:

RECOMMENDATION 8

That administrative agreements between the federal and provincial/territorial governments be reviewed with respect to effectiveness and compliance every five years or sooner if there is a concern expressed by either level of government.

Office of the Commissioner for Aquaculture Development

On December 17, 1998, the Minister of Fisheries and Oceans, David Anderson, appointed Mr. Yves Bastien to the newly created position of Federal Commissioner for

Aquaculture Development (FCAD). The Commissioner was charged with responsibility for developing the aquaculture industry in Canada on behalf of the federal government.

The mandate of the Commissioner was to bring together all appropriate federal government resources, lead required regulatory reforms, and work with the provinces to develop a vibrant, environmentally sensitive aquaculture industry. The Commissioner was to be responsible for implementing the 1995 *Federal Aquaculture Development Strategy.*

In November 2001, both the mandate of the Office of the Commissioner for Aquaculture Development (OCAD) and the term of the current Commissioner were extended for two years, until March 31, 2004. The extension was intended to allow the Commissioner to focus on providing a 10-year vision for aquaculture development in Canada and to develop recommendations on all aspects of the federal role in achieving this vision.

In the Committee's view, the Commissioner for Aquaculture Development has a vital role to play in leading regulatory reform of the industry and creating a favourable climate for the industry's development. Many stakeholders, however, believe that there is a conflict between the Commissioner's mandate to develop and promote the industry and the Department's responsibility to effectively regulate it. There is also a commonly held view that regulation has been relegated to a lower priority than development and promotion of the industry within the Department. The fact that the FCAD currently reports directly to the Minister of Fisheries and Oceans reinforces that view and causes confusion and scepticism. This state of affairs undermines the Department's goal of increasing public confidence that aquaculture is being developed in a sustainable manner. In the Committee's view, there must be a clear separation between the responsibility of the OCAD for development of the aquaculture industry and that of the Department for regulation, monitoring and enforcement, particularly if the mandate of the Commissioner and the OCAD is to be extended beyond the current term.

The Committee recommends:

RECOMMENDATION 9

That the respective roles and responsibilities of the Office of the Commissioner for Aquaculture Development (OCAD) and the Department be clearly defined in order that it is understood that the OCAD's role is to foster development of the industry while the role of the Department is to protect wild fish and their habitat through regulation monitoring and enforcement of the industry.

Siting and Coastal Zone Management

One of the reasons often cited for the great potential of the aquaculture industry in Canada is our "abundance of natural resources." Canada has a vast coastline, the longest of any country in the world, most of it bordered by clean, unpolluted water. The reality is, however, that most of Canada's coastline is unsuitable for aquaculture development, being too cold, too exposed and too remote. Consequently, most aquaculture development to date has taken place in a few fairly localized areas that include the Broughton Archipelago and Clayoquot Sound in British Columbia, the Bay of Fundy in New Brunswick (Atlantic salmon) and the coastline of Prince Edward Island (shellfish).

Proper siting of fish farms can minimize many of the potential adverse environmental and ecological effects. Characteristics of suitable aquaculture sites include: clean water, suitable temperatures, oxygen, salinity, flow, depth, and bottom type; adequate shelter; and proximity to infrastructure (fuel, power, communications, transportation). Unfortunately, many of the qualities that make for prime aquaculture sites may lead to conflict with other stakeholders (human and otherwise) who value these same characteristics.

Siting is primarily a provincial responsibility. As described earlier, under the federal-provincial MOUs, the provinces (with the exception of P.E.I.) are responsible both for issuing aquaculture leases and for the administration of leasing. Nevertheless, the siting of fish farms impinges on a number of areas of federal jurisdiction, particularly the protection of fish and their habitat under sections 35 and 36 of the *Fisheries Act*, and safeguarding the navigability of waters under the *Navigable Waters Protection Act*.

A number of major concerns emerged during the Committee's hearings regarding the siting of salmon farms: access and the siting process; environmental and ecological concerns, such as the proximity of existing farms to salmon migration routes and to salmon-bearing rivers, and the proximity of salmon farms to one another (and, as a related issue stocking density within farms); the location of salmon farms in areas unsuited to aquaculture; and, on the West Coast, particular concerns of First Nations about the infringement of Aboriginal title and rights through the placement of farms on "Aboriginal" waters.

The aquaculture industry has its own concerns with respect to siting. Fish farmers need access to suitable sites in order to conduct their business. One of their primary concerns is access to new sites; without reasonable access to suitable locations, industry expansion is constrained. Other significant impediments are the duration of leases and security of tenure, and the costs of obtaining permits for new sites. It may take several years before a new aquaculture operation generates a positive return on investment, increasing the importance of long-term, secure leases in order to attract private-sector investment. The current process for licensing new sites is lengthy and expensive. We were told, for example, that a section 5(1) approval under the *Navigable Waters*

Protection Act is valid for five years,[25] which is not long enough to generate a return on investment in an aquaculture operation. The industry has stated that the out-of-pocket costs of obtaining permits are not the only expense for operators; the lengthy process time also increases costs to owners. According to the Canadian Aquaculture Industry Alliance,[26] virtually every aquaculture operation must now undergo an environmental assessment before receiving a permit; the cost of such an assessment is estimated in excess of $100,000 for a salmon farm and approximately $20,000 for a shellfish farm.

The federal Commissioner for Aquaculture Development has addressed this issue in his *Legislative and Regulatory Review of Aquaculture in Canada*. The Commissioner notes that most suspension-type aquaculture structures are now being considered "works" under section 5 of the NWPA, which in turn triggers an environmental assessment under the CEAA.[27] This requirement is relatively new, and as yet the tools to assist the industry in understanding and complying with the new requirement are lacking. The Commissioner has indicated that because many environmental concerns are similar for various types of aquaculture operation, "Model Class Screening"[28] can streamline the assessment process, and reduce costs and time while ensuring the quality of assessments. Although the CAIA supports this approach, it is reluctant to advocate it for fear of being seen as attempting to diminish an important element of its overall environmental sustainability strategy.

We heard allegations of flaws in the siting process in New Brunswick. These included, among other things, the relocation of sites without permission, the granting of site licences before the completion of the consultation process, farms posing a hazard to navigation,[29] and a lack of consistency and transparency in the siting process.[30]

Similar allegations were made about siting in British Columbia. The Sierra Legal Defence Fund informed the Committee that, using coordinates for fish farms obtained from the Province of British Columbia, computerized navigational charts, stated to be current, and information from the Coast Guard regarding aquaculture sites, their staff had carried out a field survey of sites in the Broughton Archipelago. The results of their survey disclosed that "many fish farms are nowhere near the locations reported to the Province or Coast Guard and are nowhere near the locations shown on navigational charts." Not

---

25 Navigable Waters Works Regulations, subsection 3(1).

26 Brief to the Committee, October 30, 2001.

27 Fisheries and Oceans Canada, Office of the Commissioner for Aquaculture Development, *Legislative and Regulatory Review of Aquaculture in Canada*, Ottawa, March 2001, p. 22.

28 Ibid. "Projects that are subject to screening under the CEAA, and that have common characteristics and predictable and mitigatable environmental effects, are subject to a screening using a 'Model Class Screening Report.' This is approved by the Canadian Environmental Assessment Agency through a process outlined in the Act."

29 Grand Manan Fishermen's Association, Presentation to the Committee, October 16, 2000.

30 Atlantic Salmon Federation, Brief to the Committee, October 30, 2001.

surprisingly, given the above, they also found fish farms in locations that government information suggests should be fish farm free.[31]

According to the Sierra Legal Defence Fund, a search of the *Canadian Environmental Assessment Act* registry disclosed that there were "almost no completed CEAA assessments for fish farms."[32] In fact, they found that there appeared to be only three completed assessments.

The Canadian Aquaculture Industry Alliance disagreed that the siting process lacked transparency, although it conceded that it could be improved.[33]

According to DFO, one of its immediate priorities in the Maritimes Region was the development of a streamlined and efficient review process for aquaculture site applications in order to ensure that the process was well understood and accessible by the industry and the general public. At the time of the Committee's visit to the region, in the fall of 2000, DFO, in consultation with the provinces, was in the process of reviewing all outstanding site applications.[34]

A striking aspect of the testimony presented to the Committee is the gap that currently exists between proponents and opponents of the aquaculture industry: opponents claim the industry is not properly regulated; the industry claims that it is highly regulated and being held to standards not expected of other industries. Much of this polarization may stem from the fact that there are many unknowns surrounding the development of aquaculture. To some extent, aquaculture may also threaten the interests of established marine stakeholders. In any case, continued growth of the industry has the potential to heighten many current concerns.

Integrated Management is one of the two programs designed to implement the *Oceans Act* (Marine Protected Areas (MPAs) being the other). Integrated Management is a decision-making process, through which stakeholders and authorities work together toward common goals, plans and policies affecting specific issues and geographical areas. It is based on the precept that stakeholders, including the federal government, should seek the collaboration of other interested parties in implementing plans related to oceans, that conflicts should be addressed at the planning stage, and that long-term management plans will be based on regional and national goals.

The Committee believes that adopting an integrated management approach could help to mediate some of the differences between existing stakeholders and the

---

31 Sierra Legal Defence Fund, Brief to the Committee, May 8, 2002.

32 Ibid.

33 Committee *Evidence*, October 30, 2001.

34 Brief to the Committee, October 18, 2000.

aquaculture industry while assuring the industry of equitable access to aquatic resources and, at the same time, respecting the legitimate interests of other stakeholders.

The Committee recommends:

RECOMMENDATION 10

That the federal government adopt an integrated, coastal zone management approach to aquaculture, as mandated by the *Oceans Act* that would determine the most suitable locations for aquaculture development and other oceans industries and that would help to:

- **integrate the industry with coastal communities, include local decision making, and ensure that local communities benefit from aquaculture activities;**
- **develop the industry in an orderly manner to preserve the environment and ecosystems in partnership with coastal communities and other stakeholders;**
- **promote communications between stakeholders, reduce and mitigate potential user conflicts, and enhance public awareness of the social and economic benefits of the industry; and**
- **develop mutually beneficial links between the aquaculture industry and the traditional fishery.**

PART 3 — ENVIRONMENTAL EFFECTS OF AQUACULTURE

In the previous section of this report, we recommended the development and implementation of legislation and regulations that would govern the development of aquaculture in Canada. The Committee, however, also heard evidence that was primarily focused on environmental issues concerning netcage salmon aquaculture. These specific issues deserve to be discussed in more detail. Salmon aquaculture is still strongly opposed by a number of groups on the West Coast for a variety of reasons. Nevertheless, the industry believes that most of this opposition is based on outdated information. While the industry concedes that it was not managed optimally in its earlier days, it says that recent advances in husbandry and technology have reduced its environmental effects to a minimum.

Major issues included:

- The risk of colonization of B.C. rivers by escaped Atlantic salmon;
- The genetic interaction of escaped domestic and wild salmon stocks, which is mostly a concern on the East Coast;
- The potential for salmon farmed fish to transmit disease to wild stocks, and the need for a National Aquatic Animal Health Program;
- The environmental effects of organic wastes from netcages;
- The environmental sustainability of the industry; and
- The use of drugs, pesticides and other chemicals by the industry, and other human health-related concerns.

Fish Escapes

One of the most important issues raised before the Committee was the problem of farmed fish escapes. Witnesses addressed a variety of related issues, including the colonization of wild salmon habitat, competition for food and habitat between escaped and wild salmon, predation, genetic interactions, and disease and parasite transfer from farm salmon to wild salmon. The emphasis on these concerns is different on the West and East Coasts. In British Columbia, the Atlantic salmon is a potentially invasive exotic species. Many witnesses were concerned that Atlantic salmon might succeed in colonizing West Coast streams and rivers and establishing feral populations, which could then compete with native salmon species. On the East Coast, where both the farmed and

wild stocks belong to Atlantic salmon species, a major concern is that interbreeding with farm salmon may reduce the fitness for survival of wild salmon.

Colonization

The Atlantic Salmon Watch Program (ASWP)[35] reported that between 1991 and 2001, there were over 413,000 escaped Atlantic salmon in British Columbia.[36] This estimate may be conservative. Although producers are required to report every accident causing escapes, small escapes are often overlooked. In the 11 years for which the ASWP reported data on escapes, the proportion of escaped Atlantic salmon (relative to the proportion of other escaped farmed salmon) has grown in parallel with the growth of the farming of this species. In the past five years, two thirds of the escapes were Atlantic salmon. In the same period, the number of salmon from commercial catches has decreased steadily each year, for an estimated total of 209 million for 1991-2001.[37] Commercial salmon landings are considered to reflect the size of wild salmon stock. However, a recent report from DFO researchers attributes the sharp decline of Pacific salmon (most severe for coho and chinook salmon) to a combination of climate change, overfishing and freshwater habitat destruction. The researchers further affirm that despite speculative links, salmon farming poses a low risk to wild salmon stocks. Further, they concluded that hatchery programs for Pacific salmon currently pose a far greater genetic risk to Pacific salmon than do fish farms, by reducing genetic diversity and substituting wild salmon by hatchery fish.[38]

Attempts were made to introduce Atlantic salmon on the Pacific coast for angling purposes on several occasions between 1905 and 1934.[39] These attempts failed for reasons not fully understood. Their failure has been presented as evidence that recently escaped Atlantic salmon will also fail to colonize. For example, the SAR also concluded in 1997 that colonization would not be a significant problem. The situation is different nowadays, however. Atlantic salmon are now found in fresh and salt water in British Columbia, and as far north as Alaska. More importantly, the species can proliferate, as shown by a recent report of juveniles and adults found in three rivers in British

---

35 The ASWP is a cooperative research program operated by DFO with funding from the B.C. Ministry of Fisheries. The purpose of the program is to study the abundance, distribution and biology of Atlantic salmon in British Columbia and its adjacent waters.

36 DFO, *Atlantic Salmon Watch Program: Reported BC Atlantic Salmon Escapes*, Nanaimo, 2001, www-sci.pac.dfo-mpo.gc.ca/aqua/pages/ASWP/Atl_escapes.PDF. The total number of farmed salmon escapes for 1987-2000 was over 1.3 million in British Columbia.

37 DFO, *Summary Commercial Statistics*, www-sci.pac.dfo-mpo.gc.ca/sa/Commercial/AnnSumm.htm.

38 Donald J. Noakes, Richard J. Beamish, and Michael L Kent., "On the decline of Pacific salmon and speculative links to salmon farming in British Columbia," *Aquaculture*, 183 (3-4): 363-386, 2000.

39 John Volpe, "Do we know what we don't know? Atlantic salmon in British Columbia: a review," in Patricia Gallagher and Craig Orr, eds, *Speaking for the salmon workshop proceedings: aquaculture and the protection of wild salmon*, Continuing Studies in Science at Simon Fraser University, Burnaby, B.C., July 2000, www.sfu.ca/cstudies/science/salmon/aquaculture/aquaculture.htm., p.28-33.

Columbia.[40] Evidence that Atlantic salmon are breeding in the wild in West Coast rivers was first found in 1998, when juvenile salmon were discovered in the Tsitika River in northeastern Vancouver Island. Since then, Atlantic salmon have been found to spawn in two additional rivers,[41] and juvenile Atlantic salmon have also been found in four additional rivers. These observations contradict earlier DFO claims that Atlantic salmon could not survive in the wild and that, even if they did, they could not spawn successfully.[42]

The Committee heard different views about the probability of colonization. Dr. John Volpe stated that colonization was "inevitable." His preliminary data suggested that Atlantic salmon would undergo a rapid adaptation of fitness during colonization, with unpredictable and likely irreversible effects on native stocks.[43] A workshop on salmon farming, organized by Simon Fraser University, concluded that the possibility that Atlantic salmon would successfully invade the northeastern Pacific could no longer be characterized as remote. Workshop participants warned that natural selection could produce a population better adapted to compete:[44]

> But even if in the early going, these domesticated fish are barely able to sustain small populations in the face of aggressive competition from wild Pacific salmon, there can be no complacency. Atlantic salmon have the capacity to produce a large number of offspring. Only the fittest of these will survive and reproduce. This selection process may someday produce fish with substantially different competitive abilities than the original colonizers.

On the other hand, according to Dr. David Groves, the Atlantic salmon is not typically an invasive species.[45] This view is supported by the fact that, once extirpated, Atlantic salmon are difficult to re-establish in areas of their own native range. The original *Salmo* was a circumpolar species; but about 15 million years ago, the genus *Oncorhynchus* (the Pacific salmons) differentiated from Atlantic salmon. Despite being in the Pacific basin before the Pacific salmons, Atlantic salmon became extinct. Dr. Groves suggested that this was either because the Atlantic salmon was unable to adapt to a changing environment or because it was simply out-competed by the Pacific salmon.

---

40 John P. Volpe, Eric B. Taylor, David W. Rimmer and Barry W. Glickman, "Evidence of natural reproduction of aquaculture-escaped Atlantic salmon in coastal British Columbia river," *Conservation Biology* 14(3): 899, 2000.

41 Volpe *et al.* (2000). Sergio Paone, Brief to the Committee, February 15, 2000.

42 Sierra Legal Defence Fund, Committee *Evidence*, February 22, 2000. Georgia Strait Alliance, Committee, *Evidence*, February 22, 2000.

43 John Volpe, Brief to the Committee, February 16, 2000.

44 Lawrence Dill and Rick Rutledge, "Co-chairs' report," in Gallagher and Orr (2000), p. 2.

45 B.C. Salmon Farmers Association, Committee *Evidence*, February 22, 2000.

Dr. Eric Taylor, of the University of British Columbia, stressed the lack of information on both sides of the debate and the lack of research by DFO to objectively assess the potential ecological and genetic effects of escaped Atlantic salmon.[46]

Genetic Interactions

A major concern on the East Coast is the potential for genetic interaction between wild and domesticated salmon. North American populations of wild Atlantic salmon have been declining for 30 years for reasons not fully understood.[47] In fact, the returns of Atlantic salmon from the ocean to home rivers have been declining in both Europe and North America. In parallel, there has been an expansion of the aquaculture industry, and in particular of salmon farming. The potential threat posed by salmon farm escapees has to be included among the list of factors contributing to this decline. Farmed fish now vastly outnumber wild fish on the East Coast, and escapees now dominate annual runs in salmon rivers in areas where the salmon farms are located.[48] Atlantic salmon farming on the East Coast is concentrated in the Bay of Fundy, which accounts for 90% of the eastern Canada production. In its 1998 Stock Status Report, DFO reports that in 1994, escapees of Atlantic salmon were estimated at 20,000 to 40,000.[49] It would appear that more recent reports on salmon escapes on the East Coast are not available. The authors of the DFO report conclude that:

> A more thorough assessment of the impact of aquaculture escapees on wild salmon stocks is urgently required in the context of the growing abundance of escapees within rivers and the depressed state of some of the wild stocks.

Wild Atlantic salmon are characterized by a large number of genetically distinct populations, each adapted to the specific conditions of the river systems from which they originate and to which they return to spawn. Over thousands of years, evolution has fine-tuned the genetics of each population to its natal river. By contrast, salmon raised on farms have been subjected to an intensive domestication program to selectively breed fish with genetic uniformity, low aggressiveness, resistance to disease, and enhanced rapid growth. However, this breeding has yielded salmon stocks less adapted to a wild environment. It is thus believed that genetic interaction between escaped farmed and wild salmon will reduce the fitness for survival of wild salmon through interbreeding. There is a pressing need for research on the extent and scale of local genetic adaptations in salmon. Such adaptations are likely to have been generated by complex combinations of

---

46 Eric B. Taylor, Brief to the Committee, February 22, 2000.

47 Atlantic Salmon Federation, Brief to the Committee, October 16, 2000. Thirty years ago about 1.5 million small and large Atlantic salmon returned to spawn each year in the rivers of eastern North American. That number is now less than 350,000.

48 Ibid.

49 DFO, *Atlantic salmon Eastern Canada Overview for 1997*, DFO Science, Stock Status Report, D0-01 (1998), www.dfo-mpo.gc.ca/csas/Csas/status/1998/d0-01e.pdf.

genes, resulting from a lengthy evolution process. Research is also necessary on the long-term consequences of genetic interactions between farmed and wild fish.

A DFO workshop report reached conclusions similar to those drawn above:

> The potential for negative impacts is clear. The likelihood that wild stocks are adapted to their local environments makes it highly unlikely that the impact of farmed escapees on wild stocks will be positive. Current understanding is insufficient, however, to specify the precise nature and degree of negative impacts, which can be expected.[50]

The conclusions discussed above were not, however, shared by all of our witnesses. The Commissioner for Aquaculture Development suggested, based on a report that he had commissioned, that gene flow has a positive effect in natural populations, and that interbreeding with small numbers of escapees could have a positive effect on a wild population. In his report, *Potential Genetic Interaction Between Wild and Farm Salmon of the Same Species*, Dr. Ray G. Peterson nevertheless cautioned:[51]

> Large intrusions of farm genes into wild gene pools are expected to cause severe declines in fitness in the short-term. Recovery is likely, but several generations would be required and the stock may not survive the initial flood.

Unfortunately, the current situation on North America's Atlantic coast appears to correspond perilously to this scenario.

Despite the adoption of preventive measures by the industry, farm fish are still getting out in the wild in significant numbers. Moreover, a sustained growth of the industry may lead to greater escapes in absolute terms. The Committee believes that even with expansion, the industry should be able to reduce the total number of escapes by a combination of improved management, improved recovery efforts, and enforcement of penalties for negligent farm operators.

The Committee recommends:

RECOMMENDATION 11

That nationwide standards and regulations to minimize escapes from net pens should be adopted. These should include:

---

[50] DFO, Maritimes Region, *Interaction Between Wild and Farmed Atlantic Salmon in the Maritime Provinces*, February 1999, p. 16.

[51] R. G. Peterson, *Potential Genetic Interaction Between Wild and Farm Salmon of the Same Species*, Office of the Commissioner for Aquaculture Development, DFO, September 1999, p. 4.

- **Independent monitoring of all farm operations;**
- **Maintenance of containment system records,**
- **Tracking of inventory and losses,**
- **An identification system for all farmed fish;**
- **Immediate reporting of any escapes;**
- **Active recovery efforts; and**
- **Operating licences tied to compliance, with fines or loss of licence for escaped fish.**

In addition, that DFO, in cooperation with its partners, intensify research into reducing the number of fish escaping from aquaculture facilities and promote the adoption of the results of such research.

Given the positive role played by the ASWP in providing data on the abundance and distribution of Atlantic salmon on the West Coast, and the lack of such information for the East Coast, the Committee also recommends:

RECOMMENDATION 12

That the number of annual surveys of rivers under the Atlantic salmon watch program be expanded on the West Coast and that a similar program be introduced on the East Coast.

Fish Health

Growing healthy fish is essential to the aquaculture industry. Achieving this goal entails providing high-quality nutritious food, keeping reasonable stocking densities, ensuring good water quality, limiting sources of stress, acquiring and developing healthy fish stocks, and practising good fish husbandry. Fish farmers have strong financial incentives to minimize the incidence of disease on farms, and the industry has made rapid improvements in the management of disease. Survival rates of over 90% for farmed salmon are common today, whereas farmers struggled to achieve 65% survival rates in 1988.[52] Despite these successes, significant problems related to fish health can be observed. Many of the criticisms are directed not at the industry's failure to do what is needed from a production standpoint, but rather at its disregard of the effects of farm fish production on fish health in the wild. Critics of the industry believe that salmon farming

[52] NORAM, Brief to the Committee, February 15, 2000.

has had a negative effect on wild fish populations in regions where it has been practised, and that fish farms have been a major factor in the decline of wild salmon stocks in Norway, Scotland, Ireland, and on both the North American West and East coasts. One argument put forward by these critics is that stress caused by high stocking densities in netcages predisposes farmed fish to disease. The close physical proximity of fish facilitates the transmission of pathogens between individuals. According to the critics, when farmed fish escape or when wild fish swim close to the net pens, the risks to wild stocks are increased.

Disease reporting and surveillance, as well as the incidence of drug residues in the environment and fishes, were additional issues pertaining to fish health brought up by witnesses. The Canadian Aquaculture Industry Alliance advocated the need for a comprehensive and equitable National Animal Health Program specific to the aquatic environment. The program should include comprehensive surveillance, mandatory reporting, and compensation for farmers for ordered stock destruction. The program would give the industry the ability to respond rapidly and effectively in the event of an outbreak. According to the Canadian Aquaculture Industry Alliance's proposal, such a program would cover elements such as implementation of appropriate legislation, expanding the knowledge base on aquatic animal diseases, response procedures for different diseases of concern, and program management. The industry and DFO are already working on the development of the National Aquatic Animal Health Program (NAAHP). The Committee believes that such a program should be developed and implemented as soon as possible.

Therefore, the Committee recommends:

RECOMMENDATION 13

That the Department of Fisheries and Oceans give a high priority to the development and implementation of a National Aquatic Animal Health Program to provide for:

- **the early detection and mandatory reporting of diseases for farmed aquatic animals;**
- **regulations for the proper disposal of dead and diseased fish; and**
- **a system of compensation to farmers for ordered eradications to support effective disease management similar to that given to other livestock farmers.**

Disease transfer to the wild has been a main fish health concern raised by witnesses. Disease may be transferred by several means: by escaped fish, by

water-borne pathogens, through faeces, through hatchery and overseas introductions,[53] and via vectors such as sea lice. Thus, both the problem of escapes and the broad use of net pens potentially contribute to the transmission of parasites and diseases from farmed fish to fish in the wild. Nevertheless, there appears to be little direct and conclusive scientific evidence concerning such transmission of disease.[54] To some extent, this can be attributed to the difficulty of studying the incidence of disease in wild fish. The survival rate of wild fish is very low compared to farmed fish, and disease-related mortality is difficult to assess, as most diseased wild fish die quickly and are thus rarely observed. By contrast, disease is easier to observe in a mass culture system.[55]

Like any health management program, fish health management should be based on both prevention and treatment. Reasons for the improved survival rates observed in recent years include more effective vaccines and vaccination techniques, strict disease screening of broodstock, and isolation of year classes.[56] Improved vaccines and advanced husbandry have drastically reduced the use of antibiotics in salmon farming, to a level that is far below that of any other agricultural industry in the world. [57]

The Committee recommends:

RECOMMENDATION 14

That the Department of Fisheries and Oceans promote lower stocking densities and continued preventive fish health practices such as effective vaccines and vaccination protocols to reduce the incidence of disease in net pens.

Most losses in salmon farming are due to diseases that are categorized as fungal, bacterial, viral, or parasitic. In fresh water, fungi and protozoan parasites are the greatest threat. Eggs are particularly susceptible to fungal infection, so treatment with fungicide is necessary. In seawater, the three major concerns are (1) pancreatic disease, (2) sea lice and (3) furunculosis. Other problems may include infectious pancreatic necrosis (IPN), vibriosis and, in rare cases, bacterial kidney disease (BKD). Bacteria cause some of the

---

53 This method of disease transfer is not as significant as the others, since current regulations control these practices.

54 Some projects of the Network of Centres of Excellence in Aquaculture (AquaNet) are designed to better understand the transfer of diseases to wild populations. There is, however, circumstantial evidence that the transfer from farmed to wild fish population does occur, as exemplified by various sea lice outbreaks on the West coast, or by the detection of the ISA virus in wild salmon returning to the Magaguadavic River in New Brunswick after the escape of infected farmed salmon following a 1999 outbreak.

55 Taylor (2000).

56 NORAM (2000).

57 Myron Roth, Committee *Evidence*, March 28, 2000.

most problematic diseases for the salmon farming industry.[58] Bacterial diseases are usually treated or controlled by antibiotics, immunization, or a combination of these two methods.

The most common viral diseases for salmonids include the infectious haematopoietic necrosis, viral hemorrhagic septicaemia, infectious pancreatic necrosis, and the salmon papilloma. Recent introductions of viruses include the infectious salmon anaemia found in 1996 on farms in the Bay of Fundy, and the salmon swim bladder sarcoma virus in wild Atlantic salmon populations in 1998.

Infectious Salmon Anaemia

During the Committee's hearings, infectious salmon anaemia (ISA) received the most attention. This disease was first observed in Norway, where an outbreak in 1984 lead to a widespread plague that affected 98 farms over the next six years. The virus also infected farms in Scotland. In Canada, ISA was first detected in New Brunswick in 1996. In December 1997, the provincial government ordered large numbers of fish killed, ultimately shutting down 25% of the industry in an effort to stop the spread of the disease. Between April 1998 and June 2000, 55 farms were infected with the ISA virus and 4.1 million fish were slaughtered.[59] No compensations were initially planned for the government-ordered extermination, resulting in several farmers delaying killing potentially infected fish. Industry losses were compensated by $10 million in assistance authorized by the New Brunswick Cabinet and a $34.2 million federal allocation through the Disaster Financial Assistance Arrangement Program.[60] Infectious salmon anaemia was subsequently discovered in wild salmon in New Brunswick in late October 1999. Some witnesses criticized DFO for its failure to immediately order the slaughter of infected fish, despite Norway's experience.[61] In retrospect, the ISA outbreak in New Brunswick would probably have been handled differently had a National Aquatic Animal Health Program been in effect at the time. In particular, an effective compensation system for farmers for ordered eradications could have resulted in a different outcome. Had a National Aquatic Animal Health Program been in place, as in Recommendation 15, the federal government would have been obliged to exercise its responsibility and the province of New Brunswick would not have been forced to act by default.

---

58 Bacterial diseases include BKD (*Renibacterium salmoninarum*), furunculosis (*Aeromonas salmonicida*), vibriosis (*Vibrio anguillarum* and other *Vibrio*), enteric redmouth disease (*Yersinia ruckeri*) and coldwater disease (*Flavobacterium psychrophilum*).

59 Conservation Council of New Brunswick, Presentation to the Committee, October 16, 2000.

60 Ibid.

61 It is not clear which federal authority would have had jurisdiction in this case. The *Health of Animals Act* (1990) gives the Minister of Agriculture and Agri-Food the power to order destruction of, and compensation for, diseased animals. Though, they are considered animals, fishes are not explicitly mentioned in either the Act or its related regulations, nor in the Compensation for *Destroyed Animals Regulations*, which include a list of specific animal species covered. The responsibility for the Act and the *Compensation for Destroyed Animals Regulations* was transferred to the Canadian Food Inspection Agency upon its creation in 1997.

Sea Lice

Farmed salmon are susceptible to a number of external and internal parasites. The most significant of these is sea lice. Sea lice are small external parasitic crustaceans that infect salmonids and other fish species. Sea lice inflict damage both directly by feeding on the host's body and indirectly by making the host more vulnerable to secondary infections. Sea lice cause substantial losses for the salmon farming industry by reducing growth rate and feed conversion efficiency, by reducing marketability, through the cost of treatments for sea lice and secondary infections, and by increased mortality. One witness estimated the total economic cost of sea lice to B.C. salmon farmers at over $340,000 annually per farm.[62]

Of the threats posed to wild salmon by aquaculture, many observers believe that sea lice represent the greatest risk. According to witnesses, sea lice outbreaks in wild salmon and related species have been reported in other countries such as Norway, Scotland and Ireland, in areas where salmon farms are located.

In the summer of 2001, outmigrating juvenile pink salmon in the Broughton Archipelago were found to be carrying unusually heavy burdens of sea lice. This observation was unusual and generated considerable concern about the possible reasons for the infestation. Some witnesses, such as Watershed Watch attributed the outbreak to the large concentration of salmon farms in the area. Although the sea lice are natural occurring parasites, many observers believe that high densities of fish in the farms may act as "reservoirs" of lice, which can contribute to the infestation of wild juvenile fish, thereby affecting the commercial fishery.

In December 2001 DFO released the report of a study of sea lice incidence in the Queen Charlotte Strait. The DFO report minimized the effect of sea lice on the general health of juvenile wild salmon, finding that juvenile pink salmon as well as other species collected in two surveys appeared to be in very good condition.[63] The study did not specifically address a possible correlation between the incidence of sea lice infestation and the proximity of fish farms. The DFO study was widely criticized for both its timing and methodology.

In addition to the observation of heavy infestations of sea lice on juvenile pink salmon, there has also been an extraordinary decrease in the number of pink salmon returning to spawn in the Broughton Archipelago, from 3.6 million spawners in 2000 to an estimated 147,000 in 2002.[64] The collapse led to increasing "polarization" between environmental organizations and First Nations and the federal and provincial departments.

---

62 Watershed Watch Salmon Society, Brief to the Committee, May 8, 2002.

63 Department of Fisheries and Oceans, Studies of early marine survival of Pacific Salmon and sea lice occurrence in Queen Charlotte Strait in 2001, December 2001.

64 Pacific Fisheries Resource Conservation Council, Committee *Evidence*, February 25, 2003.

This situation prompted the Pacific Fisheries Resource Conservation Council (PFRCC) to undertake a public consultation to review the available information and gather information necessary to recommend appropriate actions. In November 2002, the PFRCC issued an advisory, urging "safe passage" for pink salmon and raising concern over the potential impact of salmon aquaculture and sea lice. The PFRCC offered, as options for action, preferably, fallowing of all salmon farms in the Broughton Archipelago, to be completed six weeks prior to the pink salmon entering the marine environment or implementation of rigorous sea lice control measures on salmon farms, geared to the protection of wild fish.

In February 2003, DFO announced a plan designed to protect pink salmon in the Broughton Archipelago. The plan shares elements with the PFRCC recommendations but proposes selective rather than area fallowing coupled with improved health management protocols. The approach is more similar to the second of the two PFRCC recommendations, but which was judged by the Council to represent the higher risk to the pink salmon stock.

Although establishing causality between the collapse of pink salmon and the prevalence of sea lice in the Broughton Archipelago is difficult to prove scientifically, the concurrence of the observations is persuasive. Appearing before the Committee, Gordon Ennis of the PFRCC summarized the issue in the following terms:

> Based upon knowledge in Europe, other studies, the farmed salmon pick up the sea lice from the natural environments, perhaps even from adult pink salmon. Sea lice is a natural organism in the environment, but with the fish being so crowded on fish farms, we feel it acts like an incubator. The fish are under stress, their loading is high, so they have a greater propensity to have sea lice on them. And each sea louse can produced, each female that's gravid, some reports say, 1.5 million eggs. So there is, indeed, a potential risk…
>
> This is not absolute scientific proof, but it was compelling, especially combined with information garnered in Europe, where there had been fish farming for years. In Norway, Scotland, Ireland, sea lice on wild salmon have been reported, reported extensively. Certainly in Ireland it's been very controversial. So the observations, combined with the knowledge of what has happened elsewhere, led the council to conclude that sea lice were the most likely cause for the collapse. It's indirect evidence, but that was our conclusion.

A number of techniques are available to fish farmers for the control of sea lice. These include preventative measures such as fallowing, the use of single-year age classes, appropriate siting, and vaccines. When outbreaks occur there are generally two options: external application of pesticides in a "bath" treatment and drugs administered in the feed. Bath treatments are costly and can cause high levels of stress to the fish. After treatment, the pesticide is released into the marine environment and some of the pesticides used to treat sea lice can be highly toxic to marine invertebrates, particularly crustaceans.

In B.C., treatment with medicated feed is the preferred approach. B.C fish farmers currently have access to two products, both of which are available by veterinary prescription only: ivermectin and emamectin benzoate or SLICE. Neither product is currently approved in Canada for use in fish. Ivermectin is approved for use in other types of animal husbandry but can be prescribed for fish under the practice of extra-label use. SLICE is not yet licensed in Canada but can be prescribed through the Emergency Drug Release program of Health Canada. Emamectin is currently in the process of being licensed by the Veterinary Drugs Directorate at Health Canada. SLICE has now mostly replaced ivermectin for the treatment of sea lice.[65] Maximum residue limits have not been set for either of these products in farmed salmon going to market in Canada.

The Committee recommends:

RECOMMENDATION 15

That DFO and the industry promote the development and use of improved methods to control sea lice, including better husbandry techniques, fallowing farms, developing louse-resistant strains of salmon, and non-chemical treatment methods; and

That the recommended National Aquatic Animal Health Program explicitly includes a requirement for monitoring and reporting sea lice levels on farmed fish, as well as specifying maximum allowable sea lice burdens.

Biological Wastes

Much of the controversy surrounding the aquaculture industry is related to net pens. One of the major criticisms levelled against the salmon farming industry is that the wastes generated by salmon farms — including faeces, vaccines, fungicides, and therapeutants — pollute the surrounding waters and the sea floor underneath the netcages. Salmon farmers depend on clean water to produce a high-quality product. Although they have an incentive to ensure that the waters they use are clean, this requirement is not sufficient to ensure that they will not generate pollutants since the ocean is large. Nevertheless, since feed accounts for approximately 60% of production costs, fish farmers have a strong incentive to maximize the efficient conversion of feed into salmon and to minimize waste. The aquaculture industry has made a great deal of progress in improving feed formulation and feeding technology. For example, B.C. salmon farmers release about a third of the organic waste to the environment than they did 10 years ago despite a 300% increase in production.[66]

---

65 Pacific Fisheries Resource Conservation Council, Committee *Evidence*, February 25, 2003.

66 B.C. Salmon Farmers Association, Committee *Evidence*, February 22, 2000.

In the late 1980s, coho and chinook had feed conversion ratios[67] (FCR) of about 2 to 1. The FCR for Atlantic salmon was about 25% better. Ratios for all farmed salmon species have since been improved by 20%. With an average farm feed budget of about $2.5 million, the superior FCR performance of Atlantic salmon is important for the profitability of the industry.[68]

Feeding efficiency has also improved dramatically since the 1980s, when feeding relied on untrained staff using basic equipment. The technology now includes underwater video cameras, and feed detection devices such as Doppler radar and Aquasmart detectors. These advances, coupled with computerized, pneumatic feed machines, have made feeding more efficient and reduced wastage of uneaten food.[69]

The feed industry has dramatically improved the quality of feed by tailoring it to the dietary requirements of the cultured species. More digestible feeds have reduced wastes (in the form of faeces) and thus the resulting effect on the sea bed (benthos). Increased digestibility is also largely responsible for improvements in FCRs.[70] Despite this success, there may still be room for improvement. It is possible that further advances in husbandry practices and the optimization of protein-energy ratios will enable FCRs to approach 1 to 1.[71]

Critics often compare farm wastes to municipal sewage. For example, the Friends of Clayoquot Sound (FoCS) estimated that, based on the 1998 production of 42,300 tonnes of salmon, B.C. farms generated raw sewage equivalent to a city of about half a million inhabitants. More recently, Dr. Volpe offered the comparison that the total suspended solids allocation from four salmon farms in Bremerton, WA, exceeds the total suspended solids from the city of Seattle (5.3 million lb/yr faeces vs. 4 million lb/yr total suspended solids). The salmon farm wastes are not treated, while the municipal sewage is filtered and sterilized at an ongoing cost of US$80 million/yr and an initial treatment facility cost of US$536 million.

Although there may be an element of truth in these comparisons, the two types of waste are not directly comparable. The discharge from salmon farms is primarily a nutrient loading issue, while concerns with municipal sewage are related more to human pathogens, heavy metals and toxic organic compounds associated with industry and urban development.

---

67 NORAM (2000). Feed conversion ratios are based on the dry weight of food to the wet whole weight of the fish.

68 NORAM (2000).

69 Ibid.

70 Ibid.

71 Scottish Association for Marine Science and Napier University, *Review and synthesis of the environmental impacts of aquaculture,* Scottish Executive Research Unit, Edinburgh, 2002, p. 35.

Fish farm wastes can have two main types of environmental effect: local accumulation of wastes, and release of nutrients in the marine environment. The accumulation of wastes immediately below the farms can smother the benthos and deplete water of its oxygen content.[72] Anaerobic decomposition of the accumulated wastes releases methane, hydrogen sulphide, and ammonia. Ammonia is a nutrient, which can potentially contribute to toxic algal blooms. It was suggested that the appearance of toxic algal blooms in the Broughton Archipelago area of the B.C. coast coincided with the arrival of the salmon farming industry.[73] Conversely, fish farm wastes can be viewed as simply as nutrients,[74] which contribute to the sea floor organic enrichment, provided that they are adequately dispersed.

The areas most affected are generally limited to the sea floor directly beneath the farm structures. The extent of the area affected is influenced by a variety of factors, such as depth and site circulation dynamics; but in the majority of sites, the effects of organic wastes can be detected only within 50 metres of the farm perimeter.[75] As constituents of waste material present a low risk to the environment, the overall effect to the environment is assumed to be low. Once a fish farm has been removed, the site's environment will recover. The Committee was informed that typical recovery periods range from 0 to 18 months, and up to 48 months in a worst case.[76]

Conditions in the Bay of Fundy are unique. The Bay is relatively enclosed, and it has been estimated that a complete exchange of water takes 76 days.[77] It was emphasized that scientific knowledge to determine the amount of waste that the Bay of Fundy region can absorb is currently lacking.[78] While the strong currents of the Bay move the wastes around and away from farm sites, they do not flush them out of the Bay efficiently. Witnesses recommended imposing a moratorium on increasing salmon production in the Bay of Fundy until science has determined what level of fish production the Bay can support without causing problems such as eutrification, anoxic sediments, and loss of biodiversity.[79]

---

72 Paone (2000).

73 Alexandra Morton, Brief to the Committee, February 16, 2000.

74 Brad Hicks, Brief to the Committee, February 22, 2000.

75 Aquametix Research Ltd., Brief to the Committee, February 22, 2000.

76 Ibid.

77 Thierry Chopin, Presentation to the Committee, October 16, 2000.

78 Atlantic Salmon Federation (2000).

79 Conservation Council of New Brunswick, Presentation to the Committee, October 16, 2000.

Witnesses criticized DFO for its failure to address these issues adequately. In principle, DFO could regulate salmon farm wastes under sections 35 and 36 of the *Fisheries Act*, which prohibit the harmful alteration, disruption or destruction (HADD) of fish habitat and the deposition of deleterious substances into waters frequented by fish. Under the terms of a 1985 Memorandum of Understanding (MOU), responsibility for section 36 of the Act was delegated to Environment Canada, although DFO still retains ultimate authority for all sections of the Act.

The Auditor General, in his December 2000 Report to Parliament, criticized DFO for failing to ensure adequate monitoring of the effects of salmon farms on fish and their habitat, and for not enforcing compliance. He also criticized Environment Canada for monitoring the effects of salmon farming only on shellfish beds and not on salmon or their habitat.[80] Moreover, he noted that no fish farm operator had been prosecuted under the *Fisheries Act* for releasing a deleterious substance having an effect on fish or fish habitat. A prosecution launched by a private citizen, in March 1999, of a fish farm operator was stayed by the Department of Justice on the basis that licensing the site with knowledge of the effects would reduce the chances of a conviction.

While a number of other industries are regulated under section 36 of the *Fisheries Act*, aquaculture is not. One explanation for this may be the dual nature of fish farm wastes as either potential nutrients or deleterious substances. In principle, fish farm waste could be regulated under the *Fisheries Act*.

Another option presented to the Committee was to amend Part VII, Division 1, Nutrients, of the *Canadian Environmental Protection Act* (CEPA) in order to explicitly include the deposition of nitrates and phosphates into marine waters from aquaculture operations.[81]

The Committee recommends:

RECOMMENDATION 16

That DFO develop environmental performance regulations explicitly for the finfish aquaculture industry under either a new Aquaculture Act or, in the interim, either the *Fisheries Act* or the *Canadian Environmental Protection Act* to control the output of nutrients and other wastes into marine waters from aquaculture operations.

---

[80] Auditor General of Canada, *Report of the Auditor General of Canada to the House of Commons*, Chapter 30, "Fisheries and Oceans — The Effects of Salmon Farming in British Columbia on the Management of Wild Salmon Stocks," December 2000, p. 30-16 — 30-17.

[81] Conservation Council of New Brunswick (2000).

In most cases, the severe environmental effects of fish farms are limited largely to the immediate vicinity of the farms themselves. Some areas such as the Bay of Fundy or the Broughton Archipelago have high densities of fish farms; in such areas, there is the potential for fish farm wastes to have a cumulative effect that extends beyond the immediate vicinity of farms and that may exceed the assimilative capacity of the region. Regulations governing the deposition of wastes should also take into account the capacity of water bodies in which large concentrations of cage sites are located to assimilate fish farm wastes.

The Committee recommends:

RECOMMENDATION 17

That, for marine areas with high concentrations of fish farm operations, a precautionary approach be adopted with respect to farm density and overall production limits until such time as scientific research can determine the capacity of the system to assimilate wastes, nutrients and other chemical products deposited from farms. If it is determined that an area cannot maintain its biological integrity at a given production level, then either total production must be scaled down or more stringent discharge limits implemented for fish farms.

Under the federal *Fisheries Act*, the Department of Fisheries and Oceans and its agent, Environment Canada, have a statutory responsibility for the protection of fish and fish habitat. The federal-provincial/territorial memoranda of understanding on aquaculture are intended to delineate responsibilities of the respective levels of government. Generally, federal responsibilities include scientific research, fish health and inspection, and the protection of fish habitat. Provincial and territorial responsibilities include promotion development and regulation. Under the terms of the MOUs (at least with New Brunswick and British Columbia), both levels of government have responsibility to conduct periodic inspections of aquaculture facilities to determine compliance with respective acts, regulations and guidelines.

Nevertheless, the issue of waste regulation remains something of a grey area. British Columbia has developed its own aquaculture waste regulations, although this is an area of federal responsibility. If DFO develops federal aquaculture waste management regulations, there is potential for duplication and confusion.

The Committee recommends:

RECOMMENDATION 18

That, as far as possible, any federal, provincial and territorial regulations allowing deposition of wastes be harmonized; and

That where provinces and territories have developed their own environmental performance regulations, DFO determine whether such regulations meet federal performance standards and, if they do not, ensure that the more stringent federal standards apply.

Reduction of the Environmental Effects of Aquaculture

The environmental effects of aquaculture are more likely to be significant when fish farms are located on or close to rearing grounds, and along migratory routes. In order to minimize these effects, other countries such as Norway and the United States have specified minimum distances between siting areas and salmon streams.[82] Given the important negative consequences of escapes in terms of colonization and genetic interactions, the Committee recommends:

RECOMMENDATION 19

That DFO conduct an exhaustive investigation into the effects of siting netcage fish farms on adult and juvenile salmon migratory routes, as well as on fish rearing grounds. In particular, safe and acceptable distances between the sites of farms and the prohibited siting areas should be determined, taking into consideration data from, and standards in place in, other countries; and

That the licensing authorities be urged, in the strongest possible terms, that the granting of additional salmon farm licences proceed with extreme caution until such a study has been completed.

Ideally, the goal for the fish farming industry should be to achieve "zero escapes." Many of our witnesses believed that only total physical containment would allow this objective to be realized. Physical containment would also solve many fish health problems, and, together with adequate waste management, would address concerns about deposited organic waste, drug and feed residues. Containment measures based on physical barriers include land-based systems, as well as closed-bag and very secure net pen culture systems. Conversion of the industry to land-based, closed, contained systems would increase production costs for the industry, thus reducing its ability to compete in a very aggressive global market.

[82] Sierra Legal Defence Fund (2000).

The Committee recommends:

RECOMMENDATION 20

That governments dedicate funds for research on the environmental effects of netcage systems, and the improvement of closed containment technology. These new systems should be phased in on a trial basis.

Sustainability

One of the arguments frequently offered in favour of aquaculture development is that it can replace the growing shortfall in production from traditional capture fisheries and relieve pressure on wild fish stocks. In its biennial reports, *The State of World Fisheries and Aquaculture*, the Food and Agriculture Organization of the United Nations consistently points out that, as traditional capture fisheries have already reached their maximum productivity, aquaculture will be expected to play a greater role in food security in the future. The same theme was repeated in the 1995 *Federal Aquaculture Development Strategy* and the B.C. Salmon Farmers Association used much the same argument when it appeared before the Committee:

> By enhancing the production of fresh farmed salmon in B.C., we can alleviate fishing pressures on remaining wild stocks while creating well-paid, full-time jobs for displaced fisheries workers. At the same time, our industry's expertise, knowledge, and resources can be brought to bear to reverse the declines of B.C.'s wild salmon populations.

Worldwide, the vast majority of aquaculture is of non-carnivorous species, mainly carp, tilapia and milkfish, as well as shellfish. Most of this aquaculture uses a low level of technology, is practised at low intensity and has a long history of sustainability.[83] A number of witnesses, however, questioned the sustainability of salmon farming, which (like the farming of other carnivorous fish species) consumes more protein than it produces. Salmon require feed with a high percentage of fishmeal and fish oil in order to replace/replicate their diet in the wild, and it is estimated that it takes approximately 3 kg of wild fish to produce 1 kg of farmed salmon.[84]

In order to meet its requirements for fish feed, the Canadian aquaculture industry depends heavily on foreign imports of fish oil and fishmeal, which come mainly from

---

[83] David W. Ellis and Associates, *Net Loss: The Salmon Net Cage Industry in British Columbia*, The David Suzuki Foundation, October 1996, p. 87.

[84] Naylor *et al*., "Effect of Aquaculture on world fish supplies," *Nature*, 405:1017-1024, 2000. A detailed calculation of this ratio is available on the Internet at www.davidsuzuki.org/Salmon_Aquaculture/Benefits_and_Risks/Net_Loss.asp. The calculation assumes that the feed is made of 45% fishmeal and 25% fish oil.

South America. Every year a considerable amount of so-called "forage fish," such as anchovies, sardines, herring, jack mackerel, capelin and menhaden, some of which may in fact be suitable for human consumption, are harvested for conversion to fishmeal and fish oil. These small pelagic fish also play an important role in the food chain as the main food source for larger predators, including cod, tuna, whales and seabirds. Harvesting forage fish reduces their availability for these top-level predators.

The Food and Agriculture Organization of the United Nations has estimated that about one third of the global catch of these forage fish species is turned into animal feeds, of which 31% is used in aquaculture production.[85] Industry experts expect that within a decade the global aquaculture industry could use two thirds of the world's fishmeal production.[86]

Thus, while the aquaculture industry often claims that it has a very small environmental footprint, largely limited to the area occupied by the farms themselves — B.C.'s aquaculture industry occupied only about 1,191 hectares of the province's coastal waters in 2000 — some critics of the industry argue that, when the area of ocean harvested to provide the supplies of fishmeal and fish oil needed by the industry are taken into account, the industry's real environmental footprint is vastly larger than the area occupied by the farms themselves. For example, according to Dr. John Volpe:[87]

> The marine area required to sustain a fish farm is 40,000 to 50,000 times the area of the fish farm itself. So if you have a one-hectare fish farm, an ocean surface area of 50,000 hectares is required to maintain that area. Using current production numbers, the B.C. industry consumes the biological productivity of approximately 7.8 million hectares of ocean. That's equivalent to about 278 times the area of all terrestrial horticulture in B.C. So this idea that the [fish] farming industry has a small environmental footprint is false to say the least.

The typical formulation of fish feed is 45% fishmeal and 25% oils, with the remaining made up of minerals and binders. Some companies are now investigating plant-based feeds. Currently, substitutes such as grains, oilseeds, fish and meat trimmings, and processing wastes are less digestible than high-quality fishmeal, and their use can result in slower growth and increased levels of organic waste such as fecal matter. Replacing fish oil is particularly problematic. Vegetable oil substitutes may decrease fish growth rates, change fish flavours, and reduce the ratio of essential fatty acids in some species.[88] Research, however, has demonstrated that partial replacement

---

[85] Naylor *et al.*, (2000). FAO, *The State of World Fisheries and Aquaculture*, 2000, Table 1. In 1999, of the 92.3 million tonnes of capture fisheries, 30.4 million went to the production of fishmeal and fish oil.

[86] T. Starkey, "IFOMA annual meeting and fishmeal report," *Global Aquaculture Advocate*, p. 45, 2000. IFOMA is the International Fishmeal and Fish Oil Manufacturers Association.

[87] John Volpe, Committee *Evidence*, May 8, 2002.

[88] P. D. Adelizi, *et al*., "Evaluation of fish meal-free diets for rainbow trout, *Oncorhynchus mykiss," Aquaculture Nutrition* 4:255–262, 1998. R. W. Hardy, "Fish, feeds, & nutrition in the new millennium," *Aquaculture Magazine* 26(1);85–89, 2000.

of fish oils with rapeseed and linseed oils can be successful in the culture of Atlantic salmon without significantly influencing growth performance.[89] Moreover, genetic modification of crop species such as soybean to produce an oil fully suitable to the dietary requirements of farmed fish may allow total substitution of fish oil with plant-based oils in the future. The level of consumers acceptance of farmed fish fed with feed derived from a genetically-modified crop would have however to be taken into consideration.

Nevertheless, it appears that carnivorous fish will continue to require more fishmeal and fish oil than herbivorous or omnivorous species. Encouraging the farming and consumption of non-carnivorous fish that are lower on the food chain would require less marine protein and could help reduce the aquaculture industry's dependence on forage fish. Furthermore, the reliance of the aquaculture industry on a single species, Atlantic salmon, makes the industry more vulnerable both to biological and economic risks. Diversifying the variety of species cultivated could also help reduce the industry's susceptibility to the economic and biological risks associated with monoculture.

The Committee recommends:

RECOMMENDATION 21

That the federal government support the aquaculture industry in its efforts to diversify the species cultivated with a view to reducing the industry's reliance on imported fishmeal and fish oil; and

That the federal government promote the research and development of feeds that use a greater proportion of plant-based proteins and oils.

Human Health

Issues related to human health fall into three categories of risk: the development of antibiotic resistance in human pathogens as a result of the use of antibiotics in aquaculture; the potential presence of harmful chemical residues in fish directed for human consumption; and the nutritional value of farmed fish as compared to the salmon caught in the wild.

Advances in fish health management practices, and particularly in vaccine technology, have contributed significantly to reductions in antibiotic usage.[90] There are a

[89] Scottish Association for Marine Science and Napier University (2002), p.36.

[90] Roth (2000). "For example, in B.C., which accounts for more than 65% of the salmon farmed in Canada, there was a 23% decrease in the use of antibiotics purchased by feed mills from 1994 to 1995. Similarly, in Norway, where medicated feed practices mirror those in B.C. and New Brunswick, the volume of antibiotics used decreased 99% between 1987 and 1998, primarily due to advances in husbandry techniques and vaccine technology. During the same period, production increased from 47,000 metric tonnes to 407,000 metric tonnes, an increase of 859%."

limited number of drugs, pest control products, and anaesthetics approved for use on fish farms in Canada. Of a total of eight, four are antibiotics. Antibiotics are used for therapeutic purposes only and not as growth promoters.[91] In practice, nearly all of the antibiotics fed to farmed fish are prescribed by veterinarians,[92] who are subject by licence to strict standards of practice and professional ethics. About 90% of the antibiotics used in aquaculture are administered as medicated feed. Despite the aquaculture industry's success in minimizing its usage of antibiotics to a level below that in other forms of animal husbandry,[93] the industry was criticized by some of our witnesses for its heavy use of antibiotics. According to these critics, fish farm wastes often contain antibiotics as well as other drugs used in fish farming, and most of the antibiotics fed to fish end up in the environment since the fish absorb only 2-10% of the antibiotics they are fed. Witnesses argued that the release of antibiotics, which include some of those used to treat human infections, into the aquatic environment increases the risk of generating antibiotic resistance among potential pathogens. These views appear to be supported by a number of studies. For example, a literature review by the U.S. Center for Disease Control and Prevention indicates that certain antibiotic-resistance genes in *Salmonella* — bacteria that can cause severe food poisoning in people — might have emerged following antibiotic use in Asian aquaculture.[94] In addition, the Task Force on Antibiotic Resistance of the American Society of Microbiology recommended in a 1994 report[95] that systematic studies be undertaken to determine the link between current clinical problems due to antibiotic resistance and fish and animal farming practices. The report specifically identified aquaculture as a concern because of the use of antibiotics at subtherapeutic levels for prophylactic purposes and the potential for drugs to become widely disseminated in the open environment due to sustained release.[96] Moreover, the task force reported on studies that showed the emergence of antibiotic resistance in pathogens in wild fish populations in close proximity to farms after farmed fish had been treated with antibiotics.[97]

Other sources of antibiotics in the marine environment, including municipal sewage and agricultural wastes can also contribute to the problem of growing antibiotic resistance in pathogens. In fact, the production of beef, pork and poultry is a major area of concern in terms of increase of antibiotic resistance in animal pathogens. In contrast, salmon

---

91 Mark Sheppard, Brief to the Committee, February 14, 2000. Hormones are not used in farmed fish grown for food in British Columbia.

92 Roth (2000). Three antibiotics are available by prescription only while the fourth, oxytetracycline, is available without prescription, although it is prescribed most of the time.

93 Ibid.

94 Frederick Angulo, "Use of antimicrobial agents in aquaculture: potential for public health impact," *Memo for the Record*, Centers for Disease Control and Prevention, October 18, 1999, www.natlaquaculture.org/animal.htm.

95 Task Force on Antibiotic Resistance, *Report*, American Society of Microbiology, 1994, www.asmusa.org/pasrc/pdfs/antibiot.pdf.

96 Prophylactic use of antibiotics is not the practice in Canada. A low sublethal and sustained concentration of antibiotic represents an ideal condition for developing resistance in target bacteria.

97 A.Ervi, *et al*., "Impact of administering antibacterial agents on wild fish and blue mussels *Mytilus edrrlis* in the vicinity of fish farms," *Dis. Aquat. Org* 18:45–51, 1994. Henning Sorum, "Antibiotic Resistance in Aquaculture," *Acta Vet. Scand.*, 92 (Suppl.): 29-36, 1999.

farming is one of the least medicated forms of agriculture; and antibiotic usage in fish farms is small by comparison with terrestrial farming and continues to decline.[98] Nonetheless, antibiotic resistance due to the use of antibiotics in fish farming is a legitimate concern.

The Committee recommends:

RECOMMENDATION 22

That aquaculture operators be required to report drug and pesticide use for each farm site.

While the development of antibiotic resistance has broad global and social implications, other potential human health issues concern mainly individuals who consume aquaculture products. Some witnesses argued that consumers should be able to choose between wild and farmed salmon and that the industry should be prepared to support labeling of farmed fish that they believe to be nutritious and safe.

One of the food safety issues discussed was the presence of residues of antibiotic drugs in farmed salmon. Since its creation, the Canadian Food Inspection Agency (CFIA) has had the responsibility for inspecting farmed salmon for the presence of such residues. According to the Georgia Strait Alliance, significant levels of antibiotics residues have been found in 3-4% of the farmed fish that go to the market. In fact, between 1997 and 1999, 0.4-1.1% of the farmed salmon tested in British Columbia showed drug residues above the maximum recommended level. The corresponding numbers for New Brunswick were 5.5% in 1997 and 1.5% in 1998. [99]

Tests are not conducted for all drugs (including antibiotics) used on salmon farms. While CFIA monitors sulphonamide and tetracycline antibiotics, it does not analyze samples for the presence of another widely used antibiotic, florfenicol.[100] Moreover, by the time tests are completed, the fish have already been sent to market, bought and in most cases consumed, preventing the possibility of any recall of products that exceed recommended levels of antibiotic residues.

---

[98] Scottish Association for Marine Science and Napier University (2002). Roth (2000): "The Department of Fisheries and Oceans fish inspection directorate, now under the Canadian Food Inspection Agency, has previously estimated that 1.6% of all feed used in the New Brunswick salmon farming industry is medicated. Similarly, the British Columbia Ministry of Agriculture and Food estimates that the total amount of salmon feed medicated annually has not exceeded 3% in the last five years in British Columbia. These figures represent the lowest medicated feed inclusion rates for food animal production in Canada."

[99] Warren Bell and Sergio Paone, Brief to the Committee, May 7, 2002.

[100] Ibid. Florfenicol is not used for treatment of human disease.

Another witness stated that federal inspections are clearly underfunded and that, as a result, only a tiny proportion of the farmed fish is actually inspected.[101]

The Committee recommends:

RECOMMENDATION 23

That the Canadian Food Inspection Agency increase the effectiveness of its monitoring program to ensure the safety of aquaculture products by expanding its testing of all drug and contaminant residues, and by providing the results in a timely manner. Moreover, actions such as public advisories and removal of products from the marketplace must be taken when maximum levels are exceeded.

Another issue that has received attention in both our study and the media is the possible presence of high levels of environmental toxins in farmed fish. One witness, Dr. Michael Easton, found high levels of dioxins and PCBs in farmed salmon in a preliminary study. According to Dr. Easton's study, a single serving of farmed salmon contained three to six times the World Health Organization's recommended daily intake limit for dioxins and PCBs.[102] Dr. Easton's study has been criticized on the grounds of its small statistical size of the sample tested (four farmed salmon, only one of which was an Atlantic salmon, and four wild salmon), the collection method, and the fact that the individual farmed Atlantic salmon used in the study had an unusually high content of fat for its size (dioxins and PCBs preferentially accumulate in fat).

The current Canadian guidelines for dioxins and PCBs contaminants in fish and fish products[103] and the recommended tolerable daily intake (TDI) values from Health Canada are reproduced in Table 6, where they are compared to the equivalent values from the Joint WHO/FAO Expert Committee on Food Additives (JECFA). Both Health Canada's maximum allowable concentration of dioxin in fish and its TDI for this contaminant are four times higher than the internationally recommended values.

---

[101] Georgia Stait Alliance, Brief to the Committee, May 7, 2002.

[102] M.D.L. Easton, D. Luszniak and E. Von der Geest, "Preliminary examination of contaminant loadings in farmed salmon, wild salmon and commercial salmon feed," *Chemosphere* 46: 1053-1074, 2002. The range of three to six times reflects the results obtained for the four farmed salmon (Atlantic and chinook) used in the study, for portions of various size ingested by individuals of various body weights. The WHO-recommended maximum daily intake is 1 pg/kg BW.

[103] Canadian Food Inspection Agency, *Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products*, 2002, www.inspection.gc.ca/english/anima/fispoi/guide/chme.shtml.

Table 6: Comparison of maximum allowable concentrations and tolerable daily intake of dioxins and PCBs

	Maximum allowable concentration in fish		Tolerable daily intake	
	Health Canada	*WHO/FAO*[104]	*Health Canada*	*WHO/FAO*
Dioxins	20 ppt	5 ppt	10 pg/kg BW	2.3 pg/kg BW[105]
PCBs	2 ppm		1 µg/kg BW	

The Committee recommends:

RECOMMENDATION 24

That Health Canada brings its PCB and dioxin guidelines into line with the recommended international standards.

Environmental toxins can be found virtually everywhere. Therefore, farmed salmon producers might argue that they have very little control over the level of contaminants found in their products. Nevertheless, one possible area for action is in monitoring the animals' diet more closely. The European Commission's Scientific Committee on Animal Nutrition has recently found that among many animal feed ingredients, fishmeal and fish oil were the most heavily contaminated with dioxins and PCBs.[106] The sale, import and manufacture of livestock feeds are regulated by the Canadian Food Inspection Agency (CFIA) under the authority of the *Feeds Act* and regulations. In view of recent international cases where concentrations of dioxins and furans were traced back to contaminated feed, the CFIA conducted a preliminary survey of dioxin and furan contamination in animal feedstuffs. Dioxins, furans, PCBs, mercury and DTT levels in fish feed, fishmeal and fish oil were all found to be below the levels set out in the *Canadian*

[104] World Health Organization and FAO through their Joint Expert Committee on Food Additives (JECFA).

[105] WHO, *Assessment of the health risk of dioxins: re-evaluation of the Tolerable Daily Intake (TDI), Executive Summary*, 1998, www.who.int/pcs/docs/dioxin-exec-sum/exe-sum-final.html. Joint FAO/WHO Expert Committee on Food Additives, *Summary of Evaluations for polychlorinated dibenzodioxins (PCDDS), polychlorinated dibenzofurans (PCDFS), and coplanar polychlorinated biphenyls (PCBs)*, 2001, can be searched at jecfa.ilsi.org. The number given is based on a recommended monthly intake of no more than 70 pg/kg BW. The standard recommended by JECFA as well as Health Canada's assessment use the TEQ (toxic equivalent quantity) concept, based on the fact that all chemicals in this group are not equally toxic and that the maximum intake has to be expressed relatively to the most toxic compound in the class. In 1998, WHO modified its recommendation for the tolerable intake of dioxins, furans and dioxin-like PCBs combined from 10 pg/kg BW to a range of 1-4 pg/kg BW. The JECFA revised its standard in 2001 to a recommended monthly tolerable intake of 70 pg/kg BW.

[106] European Commission, Opinion of the Scientific Committee on Animal Nutrition on dioxin contamination of feeding stuffs and their contribution to the contamination food of animal origin, November 6, 2000, europa.eu.int/comm/food/fs/sc/scan/out55_en.pdf.

Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products.[107] These levels were similar to those found in comparable products in Europe and in the United States.

The Committee recommends:

RECOMMENDATION 25

That the Canadian Food Inspection Agency (CFIA) conduct a more extensive survey of the comparative levels of environmental toxins in farmed fish and fish feeds.

The final aspect related to human health issues associated with salmon farming pertains to the nutritional value of farmed salmon relative to wild salmon. In particular, farmed salmon tend to have a higher content of fat and a lower proportion of desirable essential fatty acids than normally are obtained from fish. The Committee feels, however, that while this issue is significant, it should be looked at in the context of overall trends in the nutritional quality of our foodstuffs.

Proposed Federal Support of Aquaculture

Research

Witnesses, both proponents and opponents, emphasized the need for research into such issues as the environmental sustainability of the industry, fish health, and food safety. The issue of research was also addressed in the context of developing new production technologies related to aquaculture. The need for an increased federally funded research effort pertaining to aquaculture was highlighted. Although this research effort is already significant, it is perceived as being intended to financially benefit the industry rather than to understand the various environmental effects of aquaculture on marine ecosystems. The reality is, however, slightly different. A rapid survey of federally funded research indicates $36.5 million in promised investments by the Government of Canada until 2004-2005, with almost two thirds already approved or committed. This amount does not include all of DFO's in-house research or funds from programs such as the Environmental Science Strategic Research Fund. The two largest beneficiaries are DFO's Aquaculture Collaborative Research and Development Program ($20 million), and the Network of Centres of Excellence for Aquaculture in Canada, AquaNet, funded by NSERC and SSHRC ($14.4 million). Most of the AquaNet projects are directed at bettering knowledge of the ecological effects of fish farming. For it's part, the Aquaculture Partnership Program will receive $2.1 million. The Committee strongly supports these

[107] Canadian Food Inspection Agency, Animal Products Animal Health and Production, *Summary Report of Contaminant Results in Fish Feed, Fish Meal and Fish Oil*, 2002, www.inspection.gc.ca/english/anima/feebet/dioxe.shtml.

initiatives. It would like to see, however, an intensification of this research effort, the quick and efficient translation of research findings to all aquaculture stakeholders and, finally, targeting of research efforts to issues highlighted by our witnesses. The Committee believes that research should focus primarily on invasion biology, genetic interactions, and disease transmission. If, as a result of this research, an unacceptable risk to wild stocks is demonstrated, DFO and its partners should take immediate measures to ensure the full protection of wild stocks in accordance to the precautionary principle.

The Committee recommends:

RECOMMENDATION 26

That the Department of Fisheries and Oceans focus its ongoing aquaculture research programs on improving understanding in the following areas:

- **the effects of the netcage fish farming industry on wild fish stocks;**
- **the potential environmental and ecological effects of an expanded fish farming industry;**
- **fish health issues;**
- **the socio-economic effects of fish farming; and**
- **policy and governance issues related to aquaculture.**

Financial Support

As illustrated in figures 1 and 2, production and sales in the aquaculture industry continue to grow, limiting the need for federal financial assistance. If assistance is given, it must be given only when the following three criteria are met: (1) the assistance is intended to diversify the economy of a specific region; (2) there is a market failure that, if left uncorrected, would not achieve some desired result in a reasonable time, and (3) the assistance should be temporary in nature and must be phased out over time.

The use of public funds may be valid in regions where the industry is in the early stages of development, and where employment opportunities may be limited. In this case, the value of each additional job created will have a greater positive effect in these communities relative to areas where aquaculture is well established. Additionally, the use of public monies may generate positive linkages with the rest of the regional economy, for instance by helping to create a more skilled and productive labour force for the region. Federal financial assistance can have greater positive effects if it is targeted at investments that — such as roads — also benefit other regional economic sectors and

communities. Such infrastructure investments may help these areas to employ their resources more fully, allowing them to reap further benefits. The positive effects of the assistance will increase as the administrative costs are minimized.

In an area where aquaculture is in the early stages of development, lack of experience on the part of both aquaculture investors and banks may mean that potential aquaculture investors have difficulty in obtaining financial assistance from the private sector. This situation results in a market failure only if the expected benefits to the community are significant; if the expected benefits are minor, then there is no market failure, and federal government monies are better spent elsewhere, where they can generate greater positive effects. If the expected benefits are significant, however, federal financial assistance could provide necessary assurance to banks, thereby helping investors to arrange loans from banks. It may be that the private sector will eventually invest in the aquaculture sector in these areas, but for the time being does not, thereby delaying these economic benefits to these communities. Federal financial assistance will not *crowd out* investment from private sources in such cases; rather, it may speed up development in these regions.

When the industry is in the early stages of development, people — such as private lending agencies, managers, technicians, and other workers — will have limited experience with it and are therefore likely to be less productive than those in regions where an aquaculture industry is well established. At this stage, productivity increases and costs decrease over time as managers and technicians “learn by doing”, and the regional aquaculture sector should mature into an efficient competitor. This increase in competitive capacity reduces the need for financial assistance. Ideally, this assistance should be entirely phased out as these productivity increases are fully realized. As a general rule, any financial assistance must meet the following three criteria:

- the assistance is intended to diversify the economy of a specific region;
- there is a market failure that, if left uncorrected, would not recover within a reasonable time, and
- the assistance should be temporary in nature.

CONCLUSION

Aquaculture already accounts for 25% of the value of Canada's production of seafood. If the sector continues to grow as envisaged by the federal and provincial governments and by the industry itself, this will mean profound changes for the seafood industry, for other users of marine and freshwater aquatic resources, and for Canadians' attitudes to their oceans and lakes. One of these changes may be viewed as a "fencing in" of what has been until now a public resource.

Fisheries were the primary reason for the settlement of many of Canada's coastal regions, and fisheries have remained the economic basis of many communities. Canadians have a historic and an emotional bond to traditional fisheries in Canada's coastal regions, where fishing not only provides a living but is also an integral part of the cultural identity. Many communities have suffered from declines in fish stocks and have been struggling to survive. Aquaculture offers hope of economic renewal, employment and even some measure of prosperity for coastal communities. For these reasons, the Committee supports responsible development of aquaculture provided that the industry is managed sustainably, provided that wild fish and their habitat are protected, and provided that the precautionary principle is genuinely applied.

Fisheries and Oceans Canada, in its 2002 *Aquaculture Policy Framework*, has set out the federal government's vision for the development of sustainable aquaculture in Canada. The Policy Framework is the latest in a series of initiatives affirming the federal government's commitment to the development of aquaculture — a commitment that began in 1984, when the Prime Minister first named Fisheries and Oceans Canada as the lead federal agency responsible for aquaculture.

That commitment was reaffirmed in 1995 with the *Federal Aquaculture Development Strategy*, and again in 1998 with the creation of the position of the federal Commissioner for Aquaculture Development. The *Aquaculture Policy Framework* now states that, in recognition of the significant societal benefits associated with aquaculture, the Government of Canada has identified sustainable aquaculture development as a key federal priority. With the lifting of the moratorium on the expansion of salmon farming in British Columbia, the industry appears poised to expand on the West Coast. Other provincial governments appear to be no less committed.

In the Policy Framework, DFO has emphasized its commitment to policy conditions that increase the aquaculture industry's competitiveness in global markets and that increase public confidence that aquaculture is being developed in a sustainable matter. Achieving both goals simultaneously will be no easy task. Many of the witnesses who appeared before the Committee doubt DFO's commitment to the protection of wild fish stocks and their habitat, and believe that the Department's priorities increasingly lie with the development of aquaculture. The appointment of the federal Commissioner to

spearhead the cause of aquaculture development within the Department reinforced those doubts. They will be further exacerbated by continued growth of the industry in the absence of truly effective regulation and enforcement. The Auditor General of Canada, too, has voiced his concerns about DFO's ability to fully meet its regulatory responsibilities to enforce the *Fisheries Act* with respect to salmon farming operations on Canada's West Coast.

In its Policy Framework, DFO has laid out a set of nine policy principles intended to guide its efforts, through legislation, regulations, policies and programs, to support industry competitiveness in global markets and increase public confidence in the sustainability of aquaculture. We support the Department's initiatives to make the industry more competitive, provided it does this by creating a more appropriate regulatory environment, by eliminating duplication and by providing efficient services to the industry, and not by cutting corners. However, if the Department is to achieve its goal of increasing public confidence in the sustainability of aquaculture, it will have to act as more than an apologist for the industry. It will have to demonstrate that it has put in place the tools to ensure that the industry is truly sustainable, and that "sustainable aquaculture" is more than just a buzz phrase.

DFO has stated that, in its role as both an enabler and a regulator of aquaculture development, it will, among other things, ensure that federal laws and regulations relating to aquaculture are clear, efficient, effective, consistently applied and relevant to the sector. We have recommended in this report, as a means to this end, the creation of a federal Aquaculture Act that would provide the statutory authority to develop a regulatory environment appropriate to the aquaculture industry. Such an idea is not new. The Standing Committee on Fisheries and Oceans made a similar recommendation in its 1988 report, *Aquaculture in Canada*.

Legislation and regulations are by themselves insufficient. DFO must commit the necessary resources to monitor the industry and ensure industry compliance, and it must do so in a way that is transparent and accountable. DFO must also commit resources to fill in the gaps that exist in the knowledge base on the effects of fish farming on wild fish stock and their habitat, on the environment, and on human health. Where that knowledge is weak or lacking, the Department must apply the precautionary approach to which Canada is committed through the *Oceans Act* and its international obligations such as the North Atlantic Salmon Conservation Organization.

If Fisheries and Oceans Canada is to be both the enabler and regulator of the aquaculture industry, it will have to show that it is prepared to act not just in the business interests of that industry, but in the best interests of all Canadians and their marine heritage.

LIST OF RECOMMENDATIONS

RECOMMENDATION 1

That the federal government enact a federal Aquaculture Act that will:

- **recognize in law aquaculture as a legitimate user of aquatic resources;**
- **provide a legal definition of aquaculture;**
- **set out the rights and obligations of fish farm operators;**
- **recognize that aquaculture is not a fishery *per se* but is a form of animal husbandry;**
- **provide the legal basis for an appropriate policy framework;**
- **adopt a definition of "sustainable development" as follows:**

  Development that meets the needs of the present without compromising the ability of future generations to meet their own needs;[21]

- **adopt a definition of the "precautionary principle" as follows:**

  Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation;[22]

- **strive to consolidate statutes governing aquaculture so as to avoid duplication and unnecessary bureaucracy; and**
- **provide regulation-making powers to consolidate and streamline regulations applicable to aquaculture within a comprehensive set of federal aquaculture regulations.**

---

[21] This is the definition adopted in the *Oceans Act*, the *Auditor General Act*, the *Canadian Environmental Protection Act* and by the World Commission on Environment and Development (Brundtland Report)

[22] This is the definition adopted in the *Canadian Environmental Protection Act* and by the 1992 United Nations Conference on Environment and Development (The Rio Declaration).

RECOMMENDATION 2

That regulations be developed pursuant to a federal Aquaculture Act that will:

- **provide a clear set of standards for operators, other stakeholders and the public;**
- **ensure transparency, consistency and public accountability of all regulatory processes;**
- **ensure consistent application of high national standards for aquaculture across Canada; and**
- **provide long-term stability to the industry and encourage responsible and sustainable growth of the industry.**

RECOMMENDATION 3

That Fisheries and Oceans Canada allocate the necessary financial and human resources to ensure compliance of marine fish farm operations with federal environmental regulations; and, where provincial and territorial regulations exist, that DFO work with the provinces and territories to ensure that their standards, monitoring and enforcement are fully consistent with federal standards. In order to help fund these activities, DFO should establish cost-sharing mechanisms with the industry on the basis that it is being granted access to a public resource.

RECOMMENDATION 4

That the federal government establish a mechanism to ensure that sanctions are imposed on aquaculture operators who are not in compliance with federal regulations. Such a mechanism should include "whistle blower" protection for industry and government employees.

RECOMMENDATION 5

That the federal government promote a system of continual environmental improvement for aquaculture, such as the ISO 14001 standard and that Canada advocate such a system internationally to create a more "level playing field."

RECOMMENDATION 6

That the provisions of the *Fisheries Act*, the *Navigable Waters Protection Act* and the *Canadian Environmental Protection Act* be applied to all existing and future aquaculture facilities; and

That DFO fulfill its responsibility to safeguard wild fish stocks and marine resources by acting as the public watchdog of both the aquaculture and commercial fishing industries.

RECOMMENDATION 7

That DFO assert federal constitutional authority over the protection of fish and fish habitat;

That the federal government negotiate with the provinces and territories over areas of shared jurisdiction to ensure that the regulatory roles, responsibilities and accountability of both levels of government be made clear; and

That in the absence of agreement with the provinces and territories within a reasonable timeframe, DFO urge the Governor in Council to seek a reference to the Supreme Court of Canada under section 53 of the *Supreme Court Act*.

RECOMMENDATION 8

That administrative agreements between the federal and provincial/territorial governments be reviewed with respect to effectiveness and compliance every five years or sooner if there is a concern expressed by either level of government.

RECOMMENDATION 9

That the respective roles and responsibilities of the Office of the Commissioner for Aquaculture Development (OCAD) and the Department be clearly defined in order that it is understood that the OCAD's role is to foster development of the industry while the role of the Department is to protect wild fish and their habitat through regulation monitoring and enforcement of the industry.

RECOMMENDATION 10

That the federal government adopt an integrated, coastal zone management approach to aquaculture, as mandated by the *Oceans Act* that would determine the most suitable locations for aquaculture development and other oceans industries and that would help to:

- **integrate the industry with coastal communities, include local decision making, and ensure that local communities benefit from aquaculture activities;**
- **develop the industry in an orderly manner to preserve the environment and ecosystems in partnership with coastal communities and other stakeholders;**
- **promote communications between stakeholders, reduce and mitigate potential user conflicts, and enhance public awareness of the social and economic benefits of the industry; and**
- **develop mutually beneficial links between the aquaculture industry and the traditional fishery.**

RECOMMENDATION 11

That nationwide standards and regulations to minimize escapes from net pens should be adopted. These should include:

- **Independent monitoring of all farm operations;**
- **Maintenance of containment system records,**
- **Tracking of inventory and losses,**
- **An identification system for all farmed fish;**
- **Immediate reporting of any escapes;**
- **Active recovery efforts; and**
- **Operating licences tied to compliance, with fines or loss of licence for escaped fish.**

In addition, that DFO, in cooperation with its partners, intensify research into reducing the number of fish escaping from aquaculture facilities and promote the adoption of the results of such research.

RECOMMENDATION 12

That the number of annual surveys of rivers under the Atlantic salmon watch program be expanded on the West Coast and that a similar program be introduced on the East Coast.

RECOMMENDATION 13

That the Department of Fisheries and Oceans give a high priority to the development and implementation of a National Aquatic Animal Health Program to provide for:

- **the early detection and mandatory reporting of diseases for farmed aquatic animals;**
- **regulations for the proper disposal of dead and diseased fish; and**
- **a system of compensation to farmers for ordered eradications to support effective disease management similar to that given to other livestock farmers.**

RECOMMENDATION 14

That the Department of Fisheries and Oceans promote lower stocking densities and continued preventive fish health practices such as effective vaccines and vaccination protocols to reduce the incidence of disease in net pens.

RECOMMENDATION 15

That DFO and the industry promote the development and use of improved methods to control sea lice, including better husbandry techniques, fallowing farms, developing louse-resistant strains of salmon, and non-chemical treatment methods; and

That the recommended National Aquatic Animal Health Program explicitly includes a requirement for monitoring and reporting sea lice levels on farmed fish, as well as specifying maximum allowable sea lice burdens.

RECOMMENDATION 16

That DFO develop environmental performance regulations explicitly for the finfish aquaculture industry under either a new Aquaculture Act or, in the interim, either the *Fisheries Act* or the *Canadian Environmental Protection Act* to control the output of nutrients and other wastes into marine waters from aquaculture operations.

RECOMMENDATION 17

That, for marine areas with high concentrations of fish farm operations, a precautionary approach be adopted with respect to farm density and overall production limits until such time as scientific research can determine the capacity of the system to assimilate wastes, nutrients and other chemical products deposited from farms. If it is determined that an area cannot maintain its biological integrity at a given production level, then either total production must be scaled down or more stringent discharge limits implemented for fish farms.

RECOMMENDATION 18

That, as far as possible, any federal, provincial and territorial regulations allowing deposition of wastes be harmonized; and

That where provinces and territories have developed their own environmental performance regulations, DFO determine whether such regulations meet federal performance standards and, if they do not, ensure that the more stringent federal standards apply.

RECOMMENDATION 19

That DFO conduct an exhaustive investigation into the effects of siting netcage fish farms on adult and juvenile salmon migratory routes, as well as on fish rearing grounds. In particular, safe and acceptable distances between the sites of farms and the prohibited siting areas should be determined, taking into consideration data from, and standards in place in, other countries; and

That the licensing authorities be urged, in the strongest possible terms, that the granting of additional salmon farm licences proceed with extreme caution until such a study has been completed.

RECOMMENDATION 20

That governments dedicate funds for research on the environmental effects of netcage systems, and the improvement of closed containment technology. These new systems should be phased in on a trial basis.

RECOMMENDATION 21

That the federal government support the aquaculture industry in its efforts to diversify the species cultivated with a view to reducing the industry's reliance on imported fishmeal and fish oil; and

That the federal government promote the research and development of feeds that use a greater proportion of plant-based proteins and oils.

RECOMMENDATION 22

That aquaculture operators be required to report drug and pesticide use for each farm site.

RECOMMENDATION 23

That the Canadian Food Inspection Agency increase the effectiveness of its monitoring program to ensure the safety of aquaculture products by expanding its testing of all drug and contaminant residues, and by providing the results in a timely manner. Moreover, actions such as public advisories and removal of products from the marketplace must be taken when maximum levels are exceeded.

RECOMMENDATION 24

That Health Canada brings its PCB and dioxin guidelines into line with the recommended international standards.

RECOMMENDATION 25

That the Canadian Food Inspection Agency (CFIA) conduct a more extensive survey of the comparative levels of environmental toxins in farmed fish and fish feeds.

RECOMMENDATION 26

That the Department of Fisheries and Oceans focus its ongoing aquaculture research programs on improving understanding in the following areas:

- **the effects of the netcage fish farming industry on wild fish stocks;**
- **the potential environmental and ecological effects of an expanded fish farming industry;**
- **fish health issues;**
- **the socio-economic effects of fish farming; and**
- **policy and governance issues related to aquaculture.**

APPENDIX A
LIST OF WITNESSES

Associations and Individuals	Date	Meeting
Thirty-sixth Parliament, Second Session		
B.C. Salmon Farmers Association	14/02/2000	28
Anita Peterson, Regional Manager		
British Columbia Ministry of Fisheries		
Clare Backman, Finfish Biologist		
Joanne Constantine, Fish Health Veterinarian		
Bud Graham, Assistant Deputy Minister, Programs and Operations		
Bill Harrower, Finfish Biologist		
Andrew Morgan, Manager, Federal-Provincial and International Relations		
Kyuquot First Nation Corporation		
Richard Buchanan		
Living Oceans Society		
Bruce Burrows		
Musgamagw Tsawataineuk Tribal Council		
William T. Cranmer, Chief, 'Namgis First Nation		
Nootka Resource Board — Gold River		
Larry Andrews		
Sakana Veterinary Services Limited		
Mark Sheppard, Veterinarian		
Syndel International Inc.		
Jim Brackett, General Manager		
United Fishermen & Allied Workers Union		
Garth Mirau		
Department of Fisheries and Oceans	15/02/2000	29
Dorothee Kieser, Fish Health Pathobiologist		
Don Noakes, Head, Aquaculture Division		
Don Radford, Director, Fisheries Management		
Laura Richards, Acting Regional Director of Science, Pacific Region		

Associations and Individuals	Date	Meeting
B.C. Shellfish Growers Association	15/02/2000	30
Ruth Salmon		
Friends of Clayoquot Sound		
Sergio Paone		
NORAM Aquaculture		
Jamie Bridge, Farm Manager		
Island Scallops Ltd.	16/02/2000	31
Robert Saunders, President		
British Columbia Ministry of Fisheries		32
Bud Graham, Assistant Deputy Minister, Programs and Operations		
Linda Hannah, Assistant Deputy Minister, Policy and Legislation		
Hon. Dennis Streifel, Minister		
Bill Valentine, Deputy Minister		
As Individuals		
Alexandra Morton		
John Volpe		
As Individuals	18/02/2000	35
Jeremy Brown		
Buck Meloy		
Anne Mosness		
Ahousaht First Nation	21/02/2000	36
Darrell Campbell, Manager		
Joe Campbell, Band Manager		
Sidney Sam, Sr., Fishery Committee		
Kwakiutl Territorial Fisheries Commission		
Pat Alfred, President		
Victor Isaac, Vice-President		
Union of B.C. Indian Chiefs		37
Victor Isaac, Vice-President		
Tom Nelson, Spokesperson		
Stewart Phillip, President		
Ardith Walker, Legal Counsel		
United Fishermen & Allied Workers Union		
John Radosevic, President		
David Suzuki Foundation	22/02/2000	38
Lynn Hunter, Fisheries and Aquaculture Specialist		

Associations and Individuals	Date	Meeting
Future Sea Technologies Inc.	22/02/2000	38
Craig Williams, President and CEO		
Sierra Legal Defence Fund		
Karen Wristen, Executive Director		
As Individuals		
Robert Corlett		
Eric Taylor		
Karen Wilson		
Aquametrix Research Ltd.		39
Stephen Cross, President, Research Director		
B.C. Salmon Farmers Association		
Ward Griffioen, West Coast Fishculture		
David Groves, Sea Spring Salmon Farm		
Brad Hicks, Taplow Feeds		
Anne McMullin, Executive Director		
Canadian Sablefish Association		
Bruce Turris, Executive Director		
Georgia Strait Alliance		
Laurie MacBride, Executive Director		
T. Buck Suzuki Foundation		
David Lane, Research Director		
As an Individual		
R. George Peterson		
Department of Fisheries and Oceans	23/03/2000	43
John Davis, Assistant Deputy Minister, Science		
Liseanne Forand, Assistant Deputy Minister, Policy		
Iola Price, Director, Aquaculture and Oceans Science Branch		
Aqua Health Ltd.	28/03/2000	44
Myron Roth, Vice-President, Production and Regulatory Affairs		
Department of Fisheries and Oceans		
Yves Bastien, Commissioner for Aquaculture Development		

Associations and Individuals	Date	Meeting
Atlantic Salmon Federation	16/10/2000	58
Stephen Chase, Vice-President, Intergovernmental Affairs		
Bill Taylor, President		
Frederick Whoriskey, Vice-President, Research and Environment		
Conservation Council of New Brunswick		
Janice Harvey, Director, Marine Conservation		
Inka Milewski, Vice-President, Policy		
Department of Fisheries and Oceans		
Roderick MacDonald, Chief, Area Resource Management, Southwest New Brunswick		
Thomas Sephton, Director, Biological Station, Science Branch, Maritime Region		
Grand Manan Fishermen's Association		
Klaus Sonnenberg, Manager		
Huntsman Marine Science Centre		
Mark Costello, Executive Director		
Brian Glebe, Manager, Atlantic Salmon Bloodstock Production Program		
Moore-Clarke		
Mike Beattie		
New Brunswick Department of Agriculture, Fisheries and Aquaculture		
Claire Le Page, Deputy Minister		
Kim Lipsett, Director of Aquaculture		
New Brunswick Department of the Environment		
Greg Shanks, Director, Stewardship Branch		
New Brunswick Salmon Growers Association		
Nell Halse		
University of New Brunswick		
Thierry Chopin, Professor, Department of Biology		
Atlantic Salmon Federation	17/10/2000	59
Andrew Goode		
Maine Aquaculture Association		
Joe McGonigle		
Maine Atlantic Salmon Commission		
Fred Kircheis, Executive Director		
Maine Department of Marine Resources		
George Lapointe, Commissioner		

Associations and Individuals	Date	Meeting
Office of Susan Collins, U.S. Senator for Maine	17/10/2000	59
Judy Cuddy		
U.S. Fish and Wildlife Service		
Dan Kimball		
U.S. National Marine Fisheries Service		
Mary Colligan		
Aquaculture Association of Nova Scotia	18/10/2000	60
Marli MacNeil, Director		
Bob Sweeney, Vice-President		
Department of Fisheries and Oceans		
George Da Pont, Associate Regional Director General, Maritimes Region		
Darrell Harris, Senior Advisor, Aquaculture Coordination Office, Maritimes Region		
Jim Ross, Head, Habitat Management		
Legislative Assembly of Nova Scotia		
John MacDonell, MLA, N.D.P. Critic for Agriculture, Fisheries, Natural Resources and the Environment		
Thirty-seventh Parliament, First Session		
Office of the Auditor General of Canada	29/03/2001	5
Gerry Chu, Director, Audit Operations Branch		
John Sokolowski, Senior Auditor, Vancouver Office		
Ron Thompson, Assistant Auditor General, International Affairs		
Department of Fisheries and Oceans		7
Paul Cuillerier, Director General, Habitat Management and Environmental Science		
Liseanne Forand, Assistant Deputy Minister, Policy		
Iola Price, Director, Aquaculture Branch, Oceans and Aquaculture Science Directorate		
Richard Wex, Director General, Office of Sustainable Aquaculture		
Department of Fisheries and Oceans	26/04/2001	8
Yves Bastien, Commissioner for Aquaculture Development		
Jack Taylor, Executive Director, Office of the Commissioner		
Coast of Bays Corporation	11/05/2001	Informal meeting
Tracy Perry, Executive Director		
Churence Rogers, Chairperson, Aquaculture Subcommittee		

Associations and Individuals	Date	Meeting
Atlantic Salmon Federation	30/10/2001	28
Stephen Chase, Vice-President, Government Affairs		
Canadian Aquaculture Industry Alliance		
David Rideout, Executive Director		
Tofino Business Association	21/11/2001	Informal meeting
Bill Vernon, President		
University of Quebec in Rimouski	20/03/2002	45
Pierre Blier, Professor, Department of Biology, Chemistry and Health Sciences		
Marcel Lévesque, Professor, Department of Economics and Management		
Jean-Claude Michaud, Professor, Department of Economics and Management		
Claude Rioux, Professor, Department of Economics and Management		
Ahousat First Nations	07/05/2002	50
Darrell Campbell, Fisheries Manager		
B.C. Aboriginal Fisheries Commission		
Simon Lucas, Coastal Co-chair		
Arnie Narcisse, Chair		
Diane Urban, Aquaculture File Manager		
B.C. Salmon Farmers Association		
Ward Griffioen		
David Groves		
Bill Vernon		
David Suzuki Foundation		
Lynn Hunter, Fisheries and Aquaculture Specialist		
Otto Langer, Marine Program Director		
Department of Fisheries and Oceans		
Andrew Morgan, Acting Regional Aquaculture Coordinator		
Jim Naylor, Navigable Waters Protection Officer		
Andy Thompson, Research Biologist		
Fish Farm Working Group		
Sidney Sam, Sr., Member		
Friends of Clayoquot Sound		
Sergio Paone		
Georgia Strait Alliance		
Suzanne Connell		

Associations and Individuals	Date	Meeting
Musgamagw Tsawataineuk Tribal Council	07/05/2002	50
William T. Cranmer, Chief, 'Namgis First Nation		
Brian Wadhams, Outreach Co-ordinator, 'Namgis First Nation		
Connie McIvor, Outreach Co-ordinator		
Robert Joseph, Chief, Gwawaénvxw First Nation		
Willie Moon, Chief, Tsawataineuk First Nation		
Pacific National Aquaculture		
Kevin Onclin, Research and Development Coordinator		
Raincoast Conservation Society		
Theresa Rothenbush, Marine Campaigner		
T. Buck Suzuki Foundation		
David Lane, Research Director		
Taplow Feeds		
Brad Hicks, Executive Vice-President		
Government of the State of Alaska	08/05/2002	51
Dave Gaudet, Fishery Biologist, Department of Fish and Game, Special Assistant to the Commissioner for Alaska, Pacific Salmon Commission		
Sierra Legal Defence Fund		
Angela McCue		
John Werring		
Watershed Watch Salmon Society		
Craig Orr, Executive Director		
As Individuals		
Michael Easton		
Joy McPhail, MLA, Leader of the BC New Democratic Party		
John Volpe		
Thirty-seventh Parliament, Second Session		
Pacific Fisheries Resource Conservation Council	25/02/2003	19
Gordon Ennis, Manager, Secretariat		

APPENDIX B
LIST OF BRIEFS

Thirty-sixth Parliament, Second Session

Ahousaht First Nation

Michael Akerly

Larry Andrews

Aquaculture Association of Nova Scotia

Aqua Health Ltd.

Aquametrix Research Ltd.

Atlantic Salmon Federation

B.C. Salmon Farmers Association

B.C. Shellfish Growers Association

Laura Black

Robert Black

Robert Burkosky

Canadian Aquaculture Industry Alliance

Canadian Sablefish Association

Conservation Council of New Brunswick

Robert Corlett

David Suzuki Foundation

Department of Fish and Game, State of Alaska

Department of Fisheries and Oceans

Friends of Clayoquot Sound

Future Sea Technologies Inc.

Georgia Strait Alliance

Brad Hicks

Huntsman Marine Science Centre

Kwakiutl Territorial Fisheries Commission

Kyuquot First Nation Corporation

Living Oceans Society

Malaspina University-College

MariCulture Systems Inc.

Buck Melloy

Ministry of Fisheries, British Columbia

Alexandra Morton

Anne Mosness

Musgamagw Tsawataineuk Tribal Council

N.B. Salmon Grower's Association

Vic Nelson

NORAM Aquaculture

Pacific Halibut Management Association of British Columbia

R. George Peterson

Province of New Brunswick

William Rees

Sakana Veterinary Services Limited

Sierra Legal Defence Fund

St. Andrews Biological Station

Syndel International Inc.

T. Buck Suzuki Foundation

Eric Taylor

United Fishermen & Allied Workers Union

University of New Brunswick

John Volpe

West Coast Fishculture (Lois Lake) Ltd.

Karen Wilson

Thirty-seventh Parliament, First Session

Ahousat Administration

Atlantic Salmon Federation

B.C. Aboriginal Fisheries Commission

B.C. Salmon Farmers Association

Canadian Aquaculture Industry Alliance

Coast of Bays Corporation

David Suzuki Foundation

Department of Fish and Game, State of Alaska

Department of Fisheries and Oceans

Michael Easton

Friends of Clayoquot Sound

Georgia Strait Alliance

Ward Griffioen

Brad Hicks

Kwakiutl Territorial Fisheries Commission

Leader of the BC New Democratic Party

Musgamagw Tsawataineuk Tribal Council

Newfoundland Salmonid Growers Association

Office of the Auditor General of Canada

Office of the Commissioner for Aquaculture Development

Pacific National Aquaculture

Raincoast Conservation Society

Sierra Legal Defence Fund

T. Buck Suzuki Foundation and United Fishermen & Allied Workers Union

University of Quebec in Rimouski

John Volpe

Watershed Watch Salmon Society

Thirty-seventh Parliament, Second Session

Pacific Fisheries Resource Conservation Council

REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the Government table a comprehensive response to the report; however, notwithstanding the deadline of 150 days stipulated in Standing Order 109, the Committee requests that the comprehensive response to this report be tabled within 90 days of the presentation of the report to the House.

A copy of the relevant Minutes of Proceedings (*Meetings Nos. 28, 29, 30, 31, 32, 35, 36, 37, 38, 39, 43, 44, 58, 59 and 60 of the 36th Parliament, 2nd Session; Nos. 5, 7, 8, 28, 45, 50 and 51 of the 37th Parliament, 1st Session and Nos. 5, 6, 15, 16, 18, 19, 20, 21 and 24 of the 37th Parliament, 2nd Session*) is tabled.

Respectfully submitted,

Tom Wappel, M.P.
Chair

Canadian Alliance Dissenting Opinion

For the Standing Committee on Fisheries and Oceans

Re: The Federal Role in Aquaculture in Canada

The Canadian Alliance policy position on aquaculture in Canada is as follows:

> The Canadian Alliance recognizes that the aquaculture industry has expanded to provide a significant number of jobs and economic growth in coastal communities on Canada's East and West Coasts.
>
> To ensure that the salmon farming industry can coexist with sustainable recreational and commercial salmon fisheries, the Canadian Alliance would provide a stable and transparent regulatory environment to govern the interaction of aquaculture with wild fish and their habitat. Such a regulatory framework must reflect the primary obligation of the Minister of Fisheries and Oceans to protect wild fish and their habitat.
>
> Furthermore the Canadian Alliance believes that the department of Fisheries cannot be both a regulator and a promoter of fin fish aquaculture. Therefore all aquaculture promotional activities should be removed from the Department of Fisheries and Oceans.

The Canadian Alliance cannot fully support the recommendations contained in the report by the Standing Committee on Fisheries and Oceans on the Federal Role in Aquaculture in Canada, as aspects of the report conflict with our stated policy position.

The Committee is charting a course for federal intervention in an area under Quebec's jurisdiction

Dissenting opinion by the Bloc Québécois to the report on the federal role in aquaculture

The state of affairs in Quebec

The Bloc Québécois is in favour of an aquaculture industry that is in good financial and environmental health. It appears that the efforts made by the Government of Quebec over the past twenty years have produced results. We are underscoring these results and successes in order to develop this industry that is based both on the emergence of an industrial sector that is capable of delivering high-quality products and on the use of technology to support sport and commercial fishing.

Under Quebec's Fisheries and Aquaculture Policy, aquaculture is one of Quebec's preferred routes to reaching the goal of increasing the available aquatic biomass. It will also further the implementation of the resource areas economic development strategy.

Fishing production has increased from 300 tonnes in 1980 to more than 2,000 tonnes in 1999. Maricultural production, for its part, has grown steadily, from less than 100 tonnes in 1996 to 500 tonnes in 2001.

In 2002, Quebec's *Ministère de l'Agriculture, des Pêcheries et de l'Alimentation* (MAPAQ) put forward an *Act on Commercial Aquaculture* providing a framework for aquacultural development and promoting orderly growth in aquaculture in the government's water resources, as well as ensuring that these activities are carried out in a manner that respects the health and safety of the public, the environment and wildlife.

All these past and future actions and initiatives should not be diminished by federal government interventionism. The Bloc Québécois is presenting this dissenting opinion because the majority on the Standing Committee on Fisheries and Oceans are wanting to move in this direction.

We would like to take this opportunity to thank and to congratulate all those who, by giving evidence and making other contributions, provided the input that was essential to the development of this report.

On the right track

Apart from the recommendations aimed at enacting federal legislation on aquaculture (recommendations 1 and 2) and those flowing from the application of the

Oceans Act (recommendation 10), the report contains a number of worthwhile suggestions. The research projects considered are worthwhile and relevant because the federal government has a certain amount of responsibility for funding research and development. In providing such funding, however, the federal government may not impose its views and conclusions but may simply make suggestions to industry and to the national government of Quebec and Canadian provinces.

Recommendation 5 on the introduction of a system of environmental standards by the aquaculture industry is appropriate. Through environmental standards, the federal government is promoting excellence and improvement.

The recommendation on the use of drugs, antibiotics and pesticides (recommendation 22) is justified, but Quebec has already done the necessary work in this regard by banning the over-the-counter sale of antibiotics for animal use. The management of drugs, pesticides and antibiotics must be under Quebec's jurisdiction.

The Bloc Québécois takes a positive view of the recommendations for actions designed to promote greater environmental protection and better management by industry.

We also favour diversified production in order to avoid the traps and constraints inherent in a more traditional and species-limited fishery.

Recommendation 8 regarding the periodic review of administrative agreements is acceptable and valuable, and recommendation 9 on the mandates of the Office of the Commissioner for Aquaculture Development and the Department of Fisheries and Oceans is equally acceptable.

Jurisdictional boundaries

The recommendation (recommendation 1) on the enactment of federal legislation on aquaculture is a major shortcoming because it is pointless, highly interventionist and presumptuous, and gives rise to a wide range of actions that are in conflict with what is occurring in Quebec and elsewhere in Canada.

Obviously, such legislation is superfluous and will only duplicate Quebec's efforts. Legally, the *Civil Code* already guarantees ownership of mariculture leases and harvests and provides protection for producers.

In terms of jurisdiction, Quebec safeguards the rights and obligations of fish farm operators by the issuing permits and through legislation. Taken as a whole, the recommendation shows a centralizing viewpoint and leaves little room for adaptation.

Recommendation 2 reveals a desire to standardize and control an industry which is already, particularly in Quebec, subject to standards. This will ultimately generate more confusion and confrontation.

Recommendation 3 cannot be implemented without first recognizing Quebec's predominance. The federal government cannot claim to have any jurisdiction whatsoever in connection with environmental audits in Quebec. The Bloc Québécois does not recognize federal environmental legislation, in particular the *Canadian Environmental Assessment Act*, on Quebec's territory.

The intention underlying recommendation 4 only intensifies what we would call an excessively centralizing viewpoint. Quebec's legislation (the *Act Respecting the Conservation and Development of Wildlife,* the *Environment Quality Act,* the legislation on agricultural products, seafood products and food, and the *Commercial Fisheries and Aquaculture Act)* already provides a framework for the required penalties.

Recommendations 6 and 7 are not acceptable because Quebec disputes the part of the *Fisheries Act* relating to fish habitat and does not recognize the *Canadian Environmental Protection Act* as Quebec has its own *Environmental Quality Act*, enforced by the Ministry of the Environment.

Furthermore, Quebec disputes section 35 of the *Fisheries Act* where the Department of Fisheries and Oceans states that it has jurisdiction over the protection of fish and their habitat; the Quebec Government is of the view that its Ministry of the Environment has authority in this area.

This, however, provides an opportunity for us to add that the federal government should agree to re-examine issues of shared jurisdiction with Quebec.

Recommendation 10 is not acceptable, as Quebec is opposed to the *Oceans Act* because of its territorial claims in the St. Lawrence River and the Gulf of St. Lawrence. Integrated management is thus ruled out and the National Water Policy can compensate for this lack of management.

On the other hand, the objectives relating to promoting the integration of aquaculture into the coastal communities, local decision-making, aquaculture's impact on local populations and its ordered development are avenues for action that we welcome.

Recommendation 13 stands to benefit from a federal government that provides the necessary funds to existing organizations.

Conclusion

In this dissenting opinion, the Bloc Québécois would like to show, for the *nth* time, its desire to defend Quebec's interests. The difficulties inherent in a young industry, greed and disregard for the principles of sustainable development should not be used as pretexts for invading an area of jurisdiction that is exclusively Quebec's.

Aquaculture development would be better served by federal support for research and development activities in co-operation with Quebec, the provinces and the territories. The confrontational approach taken in this report, involving as it does Quebec's subordination to federal rules and regulations and their standardization from coast to coast, is harmful to the enormous potential that aquaculture has in Canada and Quebec.

The Bloc Québécois feels that aquaculture in Quebec can become, as agriculture has, a source of food and a source of economic development that is respectful of what nature and human beings can achieve together for their greater well-being, both now and in the future.

Jean-Yves Roy
Matapédia-Matane
Bloc Québécois Fisheries critic

SUPPLEMENTARY OPINION BY THE NEW DEMOCRATIC PARTY

The Standing Committee on Fisheries and Oceans Report on The Federal Role in Aquaculture in Canada. Supplementary Recommendations Peter Stoffer, MP (Sackville-Musquodoboit Valley-Eastern Shore)

As the Vice-Chair of the Standing Committee on Fisheries and Oceans, I was pleased to be a full participant in the process that led to the creation of this report.

I have no objections to the overall foundation, direction and structure of this report. There are however, several points that need clarification and some recommendations that need to be strengthened.

Community Involvement

In Recommendation 10, the report states:

> *…Integrate the industry with coastal communities, include local decision-making, and ensure that local communities benefit from aquaculture activities.*

The federal government should work to develop and implement a process to gain the consent of coastal communities and First Nations regarding the location of all existing or proposed aquaculture operations. Communities that do not support an aquaculture site should not be forced to accept one (e.g. Northwest Cove in Nova Scotia). Some aboriginal communities reject fish farms in waters that lie within their traditional territories and this request should be honoured.

Communities that have expressed an interest in developing aquaculture projects should be assisted by the government to build the industry (e.g. Coast of Bays region in Newfoundland and Labrador). Local communities must be involved in meaningful consultation to avoid conflict and be allowed to participate in the decision making of a proposed site.

Siting Issues

In Recommendation 19, the report states:

> *That DFO conduct an exhaustive investigation into the effects of siting net-cage fish farms on adult and juvenile salmon migratory routes, as well as on fish rearing grounds. In*

particular, safe and acceptable distances between the sites of farms and the prohibited siting areas should be determined, taking into consideration data from, and standards in place in, other countries; and

That the licensing authorities be urged, in the strongest possible terms, that the granting of additional salmon farm licences proceed with extreme caution until such a study has been completed.

I suggest that DFO prohibit the development of fin fish aquaculture near or in major salmon bearing rivers, migration routes, feeding locations, productive lobster or shellfish beds, or other sensitive habitats. Setting site guidelines of a specified distance from a salmon stream or migration route is not, in several cases, adequately precautionary.

DFO should work with industry to phase out current aquaculture sites located in these areas — using the precautionary principle as the motivation for this policy. This siting policy would help prevent interaction and disease transmission between farmed and wild salmon. In a 1999 report, DFO recommended that the siting of cages within salmon rivers or near their mouths should be avoided because complete containment is not feasible, and even if achieved, would not eliminate the risks of ecological interaction or disease transmission between farmed and wild salmon.

Closed-Loop Systems

In Part III, the report states:

Conversion of the industry to land-based, closed, contained systems would increase production costs for the industry, thus reducing its ability to compete in a very aggressive global market.

Then, the report states in Recommendation 20:

That government dedicate funds for research on the environmental effects of net-cage systems, and the improvement of closed containment technology. These new systems should be phased in on a trial basis.

I strongly urge the government to work with industry to develop closed-loop aquaculture systems for fin fish aquaculture. The use of closed-loop fin fish aquaculture should be phased in as the only system permitted in Canada. Closed-loop containment, on land or at sea, isolates the fin fish farm from the marine environment by replacing net cages with impermeable structures. Water, waste, and other elements within the fish pen are contained and not released into the surrounding environment in a closed-loop system. Isolating the farmed fish in this manner may resolve many of the environmental concerns associated with aquaculture. While closed loop systems involve a higher capital investment, these costs can be offset by greater yields. Fewer fish escapes, more efficient use of food, and high fish survival rate are some of the economic benefits

of closed loop systems. The government should work with industry to support the research and development of closed loop aquaculture systems.

Due to the diverse opinion and controversy of fin fish farms in British Columbia, we believe a moratorium on the further expansion of fin fish farms in this province should be continued until all major stakeholders can reach agreement on their issues and concerns.

Fish Meal and Fish Oil

In Recommendation 21, the report states:

> *That the federal government support the aquaculture industry in its efforts to diversify the species cultivated with a view to reducing the industry's reliance on imported fish meal and fish oil.*
>
> *That the federal government promote the research and development of feeds that use a greater proportion of plant-based proteins and oils.*

The federal government should set immediate reduction targets to eliminate the use of fish, that could be used for human food (such as herring, mackerel, sardines, and anchovy) as the primary feed for farmed salmon. Also, the federal government should prohibit the use of any feed derived from a genetically modified crop. The Federal New Democratic Party does not support the use of genetically modified, engineered or altered fish for aquaculture purposes or any other use.

Regulatory Responsibilities

Critics of aquaculture have debated whether DFO should maintain responsibility for aquaculture at the federal level. After much thought, I believe that DFO should remain the federal department responsible for aquaculture. That said however, DFO must ensure the protection of wild fish stocks and their habitat is its first priority and ensure that the aquaculture industry meets the provisions of the Fisheries Act, the Navigable Waters Acts and that the provisions of the *Canadian Environmental Protection Act* are applied to all existing and future aquaculture facilities.

Use of Pesticides

In Recommendation 15, the report states:

> *That DFO and the industry promote the development and use of improved methods to control sea lice, including better husbandry techniques, fallowing farms, developing louse-resistant strains of salmon, and non-chemical treatment methods;*

The use of pesticides that have not been thoroughly tested for their effects on marine organisms should be prohibited. Furthermore, when products are approved for use under the *Pesticide Control Products Act* (PCPA), their use may contravene the *Fisheries Act*. As I recommended earlier, DFO must ensure the protection of wild fish stocks and their habitat is its first priority. Sections 35 and 36 of the *Fisheries Act* prohibit the harmful alteration, disruption or destruction of fish habitat and the deposition of deleterious substances into waters frequented by fish. DFO must ensure that all aspects of aquaculture operations — including pesticide use - do not contravene the *Fisheries Act*.

In addition, the government must set maximum residue limits for any pesticide in use for farmed salmon going to market in Canada. Limits have not been set for emamectin benzoate and ivermectin — pesticide products still awaiting approval for use in fish. These products, however, have been prescribed and used on farmed salmon in Canada through the Emergency Drug Release program of Health Canada. Residue limits must be set to protect the health of consumers.

Additional Recommendations

In addition to the above suggestions, I have some specific supplementary recommendations. They are as follows:

- The federal government should regulate industry to adopt a labelling system for farmed fish. Consumers should be able to make a personal, informed choice between wild and farmed fish. Farm salmon is currently labelled “fresh” or “Atlantic” but for many consumers the relevant distinction is ‘farm or wild’.

- The government should place a permanent ban on the krill fishery within Canadian waters and ban any importation of krill. Krill is a large shrimp like plankton eaten by whales and many fish including herring and salmon. Krill is in high demand by the salmon farming industry as krill acts as an effective feeding stimulant. Scientists have warned that catching fish with lower trophic levels (e.g. krill and herring) may greatly impact the sustainability of fish population. These smaller fish form the building blocks of the marine ecosystem and are food for the larger fish. Harvesting these small fish impacts on the amount of food left for the ‘high trophic level’ fish.

Conclusion

I want to thank all the members of the committee and witnesses who participated in this report. I trust that you will give my suggestions serious consideration and I thank you for the opportunity to provide my input.

Sincerely,

Peter Stoffer MP
Sackville-Musquodoboit Valley-Eastern Shore

Dissenting Opinion by John Cummins, M.P. to the Report on the Federal Role in Aquaculture

EXECUTIVE SUMMARY

To ensure sustainable recreational and commercial fisheries the Department of Fisheries and Oceans must be divested of its illegitimate mandate to act as a promoter of aquaculture and reassert itself as the protector of wild fish and their habitat.

The Constitution, Parliament and the Courts have all recognized the leading role and responsibility the Fisheries Minister and his Department must play to ensure the preservation of our marine heritage.

Nevertheless in spite of ample evidence that fin fish aquaculture is not a benign activity the Department of Fisheries and Oceans has never undertaken enforcement actions and prosecutions under the *Fisheries Act*. There is documented evidence that the Department has no idea of the extent or location of fish farm activity in our coastal waters and that it has misled the Minister, encouraged him to mislead Parliament and lied to the public in an effort to minimize problems associated with the aquaculture industry.

In an effort to demonstrate “responsibility” and allay public concerns aquaculture advocates within the Department of Fisheries have suggested that all that is needed to “fix” the problem is a new *Aquaculture Act* or at the very least a rewriting of the *Fisheries Act*.

This is patent nonsense. The *Fisheries Act* bestows on the Minister of Fisheries all the powers he needs to protect wild fish and their habitat while allowing for the proper development of a viable aquaculture industry. The call for new legislation represents nothing more than a demand that aquaculture be given priority over wild fish and their habitat, a concept few Canadians will buy into.

We recognize that the aquaculture industry can provide economic opportunity for residents of coastal communities but these opportunities can only be legitimate if the Minister of Fisheries and his Department exercise their responsibility to protect wild fish and their habitat.

The aquaculture industry has expanded to provide a significant number of jobs and economic growth in coastal communities on Canada’s East and West Coasts.

However to ensure sustainable recreational and commercial fisheries a stable and transparent regulatory environment must govern the interaction of the aquaculture industry with wild fish and their environment. These regulations must reflect the constitutional and primary responsibility of the Minister of Fisheries and Oceans to protect wild fish and their habitat.

Both the Pacific Fisheries Resource Conservation Council and the Auditor General of Canada question the commitment of the Minister of Fisheries to his role as protector of Canada's fisheries resource from the effects of salmon farming.

> "Aquaculture presents a threat to the salmon fisheries. The Council concludes that sea lice originating from net pen aquaculture operations were the most likely cause of the decline in Broughton Archipelago pink salmon stocks... The government needs to emphatically state that wild salmon come first and manage its aquaculture industry in a precautionary manner."
>
> **Pacific Fisheries Resource Conservation Council Brief**
> **to the Standing Senate Committee on Fisheries and Oceans**
> **March 18, 2003**

> "The Department is not fully meeting its legislative obligations under the *Fisheries Act* to protect wild Pacific salmon from the effects of salmon farming. We found the Department is not fully carrying out its current regulatory responsibilities to enforce the *Fisheries Act* with respect to salmon farming operations."
>
> **The Effect of Salmon Farming in British Columbia**
> **on the Management of Wild Salmon Stocks**
> **Report of the Auditor General of Canada — December 2000**

The challenge posed by aquaculture, that is the potential environmental risks to fish and fish habitat from fish farm operations, was outlined in a 1999 paper by P.W. MacKay, entitled *Perspectives on the Environmental Effects of Aquaculture*. The risks included:

(1) organic loading of the sea-bed;

(2) use of anti-foulants on structures and nets;

(3) interaction between escaped farmed salmon and wild stocks and wild salmon by genetic contamination;

(4) pressure on wild stocks from increased parasitism (sea lice) arising from farmed fish;

(5) environmental effects of chemical therapeutants used to control parasites;

(6) combined effects of numbers of fish farms in partially enclosed bays potentially posing risks, as follows:

- natural biological processes being distorted by raised nutrient levels
- enhanced possibility of blooms of toxic algae
- more rapid spread of disease
- depletion of dissolved oxygen

Aquaculture — Whose Responsibility is It?

In its report on aquaculture the job of the Standing Committee on Fisheries and Oceans was to satisfy itself that the Department of Fisheries and Oceans (DFO) has fulfilled the mandate and responsibilities established by the Constitution and by Parliament with regard to its management of aquaculture.

What Does the Constitution Say?

> "The federal Parliament has exclusive constitutional authority over all aspects of fisheries management in tidal waters."
>
> **Guide to Fisheries Resource Use Considerations in the Evaluation of Aquaculture Site Applications Department of Fisheries and Oceans, February 15, 2002**

The Constitution gives the federal government complete authority for fisheries in coastal waters where fish farms are located. Section 91(12) provides that Parliament has authority over "Sea Coast and Inland Fisheries." It further provides at 91(10) that Parliament has authority over "Navigation and Shipping."

When British Columbia joined Confederation in 1871, the Terms of Union left no doubt that the federal government was assuming responsibility for fisheries and navigation. Section 5A provided that, "Canada will assume and defray the charges for the ... Protection and Encouragement of Fisheries." Newfoundland's Terms of Union in 1949 also recognize the federal authority over fisheries.

What Do the Courts Say?

Between 1871 and 1949 the courts responded to several fisheries constitutional references. In the *British Columbia Fisheries Reference* in 1914 they found that "by s. 91 of the *British North America Act, 1867*, the exclusive legislative authority of the Parliament of Canada extends to all matters coming within 'sea coast and inland fisheries'. ... the object and the effect of these legislative provisions were to place the management and protection of the cognate rights of navigation and fishing in the sea and tidal waters exclusively in the Dominion Parliament."

The decisions since 1914 have consistently held that the power over fisheries in coastal waters is exclusively within the competence of Parliament. In *Interprovincial Co-operatives* the Supreme Court of Canada said the federal fisheries power "is concerned with the protection and preservation of fisheries as a public resource, concerned to monitor or regulate undue injurious exploitation, regardless of who the owner may be, and even to the suppression of the owner's right of utilization." In 1996 in *Nikal* the Supreme Court held that it is the federal government which is, "required to manage the fishery and see to the improvement and increase of the stock."

The Supreme Court has determined that the federal government has exclusive jurisdiction to regulate marine pollution. In the 1988 *Crown Zellerbach* decision the Court held that "marine pollution, because of its predominately extra-provincial as well as international character and implications, is clearly a matter of concern to Canada as a whole."

What Has Parliament Said?

Parliament has enacted two key statutes that authorize the federal government to protect the public rights of fisheries and of navigation — the *Fisheries Act* and the *Navigable Waters Protection Act*. The need to protect the right of navigation and fisheries does not change from year to year. Both the *Fisheries Act* and the *Navigable Waters Act* date back to the 1800's and have been amended from time to time but the underlying rights of navigation and fisheries are embedded in our Constitution, reaching back to the *Magna Carta*.

An obstacle to navigation is an obstacle to navigation. A fish farm might be new, but its novelty is not the problem. The only matter to be considered is whether the fish farm is an obstacle to navigation. Section 5 of the *Navigable Waters Act* requires that any work placed in a navigable water must be approved by the Minister of Fisheries.

Similarly, a threat to the right to fish, fish stocks, or fish habitat is still a threat. That a net pen fish farm might be a recent invention is not a problem for the *Fisheries Act*. The only matter to be considered is the impact of the fish farm on the public fishery, fish stocks, and fish habitat. <u>The advent of fish farms do not so much demand a change to the Act as they do the active enforcement of the Act.</u>

The *Canadian Environmental Assessment Act,* while not restricted to fisheries maters, has become fundamental to the protection of fish habitat. This Act was passed in 1992 but not proclaimed until 1995. Its mandate is to require assessment of potential adverse environmental effects associated with works or undertakings. The *Law List Regulations* enacted under the Act in 1994 provide that approvals for certain works or undertakings regulated by the *Navigable Waters Act* and the *Fisheries Act* will trigger an environmental assessment.

Finally the *Oceans Act* identifies the Minister of Fisheries and Oceans as the lead Minister to develop policies involving Canada's coastal waters. The potential of the Act to endow the Fisheries Minister with the responsibility and authority to pursue and develop an integrated oceans policy has yet to be realized. Regrettably Parliament failed to set out a clear policy in the statute as it had done in the *Fisheries Act*, the *Navigable Waters Protection Act*, and the *Canadian Environmental Assessment Act*.

Environmental Assessment — the Triggers

Section 5 of the *Navigable Waters Act*: An environmental assessment is triggered by any application under section 5 of the *Navigable Waters Act.* Section 5 requires that when any work or undertaking is placed in navigable waters an approval under the Act is required. An environmental assessment would be triggered by the placing of a fish farm in navigable waters. The Department exempted fish farms from assessment until late 1999. After considerable trial and error a workable process to undertake assessments was established in late 2002 with the Church House farm assessment.

Section 35 of the *Fisheries Act*: This section prohibits destruction of fish habitat. An environmental assessment is triggered under section 35(2) of the *Fisheries Act* when the Minister authorizes the alteration, disruption or destruction of fish habitat by any means, or under *Fisheries Act* regulations. Section 35 would normally trigger an assessment after the destruction of habitat has occurred or when the Minister has authorized the destruction. The Department in a briefing for the Minister explained section 35's application to fish farms in the following manner:

> "Finfish farms often result in the accumulation of organic matter — fish food and faeces, in the vicinity of net pens, which could cause harmful alteration of fish habitat, requiring an authorization under section 35(2) of the Act. This would likely occur only after some period of ongoing operation."

The Law Ignored

The Minister advised Parliament on December 9, 2002 that fish farm operators "require an authorization if a harmful alteration, disruption or destruction of fish habitat is expected to occur. To date, no aquaculture proponent has requested an authorization." The Minister has never enforced section 35 against habitat destruction by fish farms, nor has he caused regulations to be enacted to govern fish farms. The Pacific Fisheries Resource Conservation Council advised the Fisheries Committee that the Department of Fisheries has never undertaken enforcement actions or prosecutions under the *Fisheries Act*.

As a result of having never used or enforced section 35 of the *Fisheries Act* to protect fish habitat, the *Canadian Environmental Assessment Act's* environmental assessment trigger has never been activated.

An Attitude Problem — We Don't know and We Don't Care

The Department exempted farms from assessment under the *Navigable Waters Act* until late 1999. To date out of the eighty to ninety farm sites operating on the West Coast, only six have successfully completed an assessment.

With the exception of the six farm sites approved since 1999, virtually all the other farms on the West Coast should be assessed under the *Navigable Waters Act*. The initial exemption was for the period of the provincial lease and for the original configuration of nets and anchor lines. A significant number of the initial licences issued by British Columbia have expired, the farms have moved to new locations or are to be moved, have reconfigured their nets and anchor lines or have expanded or intend to expand at their present site beyond what had been exempted prior to 1999.

Similar problems exist on the East Coast.

A July 25, 2002 internal document, dealing with a May 16, 2002 question in Parliament on "the establishment of salmon farm operations in Canada's coastal waters and the requirements of the *Fisheries Act* and *Navigable Waters Protection Act,*" states:

> "As for John Cummins' ministry inquiry for all kinds of regulatory approval information, it doesn't look like there's a lot of information that's going to be forthcoming, as it seems DFO either doesn't collect or retain a lot of the information that he's looking for (this is what Programs seems to be discovering). It doesn't look as if the Habitat Referral Tracking System or the Navigable Waters Database System is turning up much in the way of information pertaining to Mr. Cummins' request. ... for aspects of this request where this is the case, Mr. Cummins is going to be referred to the appropriate provincial contact."

A September 11, 2002 internal document states:

> "Mr. Cummins asks a number of questions regarding details around the number of salmon net pens ... with Navigable Waters Protection approvals, the number without ...
>
> While our first instinct was to just tell him to ask the provinces, we thought it would be inappropriate.
>
> "We will still refer him to the provinces for a lot of the detail and for confirmation of what we tell him, but can you give me the current number of approved sites for each province and the number we think are in operation?"

A September 17, 2002 internal document states:

> "We believe there are approximately 16 that are in the water without authorization, that we are aware of [in the Maritimes]. There is a potential to be several more that we are not aware of since in the recent past there have been several in the water that we have never received applications for."

These and other related documents, together with the previously mentioned farms operating outside the laws established by Parliament, paint a picture of a Department having little or no idea what is happening in our coastal waters and with no idea if approvals have been sought or given under the *Navigable Waters Act*. This creates a gnawing sense that the Department lacks either the interest or will to enforce the *Fisheries* and *Navigable Waters Acts* and to undertake the required environmental assessments. It is an indictment of a Department that has forgotten why it even exists. It is not new legislation that is needed, it's a wholesale departmental house cleaning from top to bottom that is required.

A Growing Backlog

Out of the several hundred fish farms existing on both the Pacific and Atlantic coasts, only a handful are operating under authorizations from the *Navigable Waters Act* following a successful environmental assessment as required by Parliament. On the Pacific Coast there are several dozen applications under the *Navigable Waters Act* facing environmental assessment. The backlog on the East Coast is nearly as long.

The back log in British Columbia is likely to grow. The initial leases given in the eighties were for 20 years and most of them are coming up for renewal, thus triggering applications and environmental assessments under the *Navigable Waters Act*. In addition, many of the farms wish to expand at their present site, have expanded without authorization, or are no longer in conformity with the original lease and therefore have triggered environment assessments.

There are eight new applications in British Columbia, none of which have been approved. There are four "pilot projects," only one of which has been approved.

Out of the seventeen farms that have completed relocations in British Columbia, only five have completed environmental assessments and site approvals under the *Navigable Waters Act*: Jackson Passage, Hardwicke "B", Marsh Bay, Doctor Islet, and Humphrey Rock. The rest operate illegally.

The Minister advised Parliament on December 9, 2002 that "as provincial tenures for existing sites come up for renewal, DFO will review these sites pursuant to the appropriate section of the *Navigable Waters Protection Act*," yet not a single approval or environmental assessment under the Act was done prior to the expiry of provincial

tenures in British Columbia. As a result, the Province simply renewed some forty to fifty farms without approvals under the *Navigable Waters Act*. These farms continue to operate outside the law.

The Department routinely ignores the section 35 *Fisheries Act* prohibition against the harmful alteration, disruption or destruction of fish habitat. In addition, with virtually every farm site in British Columbia operating without an authorization under the *Navigable Waters Act* consistent with their present activities, the backlog has reached a crisis stage.

Flaunting the Law

As a result of the backlog and the general failure to prosecute those who ignore the law, farms are not waiting for approval before expanding or establishing a new site farms, or undertaking new or expanded operations on their present sites.

In early 2002 Omega Salmon Group relocated salmon pens to Kent Island, British Columbia without a *Navigable Waters Act* approval and related environmental assessment. On March 13, 2002, they placed fish at the Kent Island site. Omega also expressed its intent to stock a site at Masterman Island without the required approval and environmental assessment.

Navigable Waters staff conducted a site visit at Kent Island on May 7, 2002.

On June 3, 2002 the Department advised the Minister that the farm was operating illegally at Kent Island and that the Province was complicit in the problem. They reported:

- "A scuba reconnaissance of the shallow sub-tidal fish habitat determined that the productive capacity and bio-diversity of this area is high."
- "The site supports populations of abalone (a threatened species), red, purple and green sea urchins and sea cucumbers...."
- "In addition to navigational safety concerns and potential impacts on the habitat, Omega has deviated from its proposed management plan."
- "The Kent Island site is currently stocked with [DELETED] Atlantic salmon instead of the [DELETED] fish proposed in its management plan...."

- "MAFF [BC Ministry of Agriculture Fish and Food] has submitted a brief to Crown Counsel regarding the unauthorized stocking at Kent Island. MAFF has since issued the licence ..."

The Department never took enforcement action and claims to be still studying the matter for possible prosecution under either the *Fisheries Act* or the *Navigable Waters Act*. The farm has since ceased operations at the Kent Island site.

Pressure on Department to Circumvent Environmental Assessment

Departmental briefings for the Minister alert him to the pressure staff are being put under even where there are acknowledged environmental concerns:

> "The Oscar Passage site is still undergoing *Canadian Environmental Assessment Act* review and there is considerable pressure from Marine Harvest to expedite the process. DFO staff did a quick visit and identified what they considered to be very high habitat values in the area, including a potentially significant abalone population." [June 2002]

Aiding and Abbeting an Illegal Activity

When DFO refused to enforce habitat protection provisions of the *Fisheries Act*, former B.C. Member of Parliament Lynn Hunter initiated a private prosecution against Stolt Sea Farms operations in 1999. Based on the evidence presented by Ms Hunter the Court agreed to consider the case. It became clear that Stolt operations had lead to the destruction of fish habitat. Department of Justice lawyers acting on behalf of the Department of Fisheries took over the prosecution. Instead of moving to convict Stolt the Crown sought a stay of proceedings. It was claimed that the Crown believed they could not successfully convict Stolt as the Department of Fisheries had been aware of the likelihood of the alleged habitat destruction, yet encouraged the aquaculture operation. DFO was now precluded from prosecuting what they had been a party to.

At the moment the *Fisheries Act* is not being enforced and no regulations have been issued under this Act that would trigger an assessment. If the *Navigable Waters Act* were enforced, it might well lead to the shut down of the majority of existing farms as they are not operating in conformity with the Act.

The Sierra Legal Defence Fund's senior legal counsel, Angela McCue, advised the Fisheries Committee that she had "reached the inescapable conclusion that aquaculture, as it is currently carried on in the province of British Columbia, is illegal and places already vulnerable wild Pacific salmon stocks at serious risk."

It is difficult to argue with Ms McCue's conclusion. Most of the fish farms in British Columbia would appear not to be in conformity with either the habitat protection provisions of the *Fisheries Act* or the *Navigable Waters Act*.

Stocks Pushed Toward Extinction in the Broughton Archipelago

A December 2000 report prepared for DFO, entitled *An Evaluation of Knowledge and Gaps Related to Impacts of Freshwater and Marine Aquaculture in the Aquatic Environment*, warned of the danger that salmon farms can act as incubators of disease and of possible transfer to wild stocks:

> "Concerns exist regarding the effects of farmed species on wild stocks, especially with respect to natural salmonid populations. The incidence and transfer of disease is a key concern. A higher incidence of disease within farms often arises as a result of increased holding densities conditions and other conditions suitable for propagating pathogenic organisms. In addition to necessitating the use of antibiotics and therapeutant ..., there is concern about the potential for disease propagation and transfer from cultured fish to wild stocks. (Noakes et al. 2000)"

A serious sea lice infestation was observed in 2001 in the Broughton Archipelago, the area with the highest concentration of farms in British Columbia. In 2002, the Hon. John Fraser, Chair of the Pacific Fisheries Resource Conservation Council, declared that a crisis existed in the Broughton with returns of pink salmon having declined in some inlets to "between a hundredth and thousandth." A 99.9 percent decline is not merely precipitous, it means that some runs of pink salmon border on extinction.

Mr. Fraser recently advised Parliament that "based on the evidence given by senior fisheries biologists in the Department of Fisheries and Oceans, we concluded that the inference could properly be drawn that there was a connection between lice on farmed fish and lice we were getting on the smolts, and that was killing them."

Dr. Jeff Marliave, a marine biologist, Vice President of Marine Science at the Vancouver Aquarium and member of the Pacific Fisheries Resource Conservation Council, advised Parliament as to why baby pink salmon are so vulnerable. He noted that unlike coho, steelhead, chinook or Atlantic salmon, the smolts of sockeye, chum and pink are exceptionally small. "The pink salmon are the smallest... that is what results in fatality, they are just too small to be able to handle this kind of infection, it is not normal for it to occur."

Dr. Marliave stated, "with the salmon farms being situated in the protected waters like the Broughton Archipelago, you have millions of adult salmon supporting the life history of sea lice right near the river estuaries where the salmon smolts come out," making it very clear that DFO allowed the fish farms to be sited in the wrong location.

Mr. Fraser reminded the Department of the “European experience and research on sea lice, and its effect in areas such as Ireland, Scotland and Norway.” Sea lice, he said, were found to be a threat to young salmon smolts in areas of intense salmon farms, such as the Broughton and he noted that in Norway up to 50 percent mortality occurred near the farms. While research has been conducted in Europe, Mr. Fraser lamented that DFO has yet to undertake the necessary research.

Mr. Fraser believes that there is a risk of “irreversible harm” to salmon runs in the Broughton and called for the removal of salmon from all farmed sites by the end of February 2003. The Department refused.

DFO has sometimes argued that fish farm operators will adequately control sea lice levels because uncontrolled lice infestations harm the profitability of the farm. Yet the control of lice necessary to maintain the profitability of farms may not be enough to protect wild stocks. Recent Norwegian research by P.A. Heugh, *Public Management of the Salmon Louse Problem in Norway: Where Are We Heading*?, indicates that control over the level of sea lice infestation necessary to protect wild stocks exceeds that required by farm operators purely on economic grounds. This is, of course, why John Fraser and others have faulted DFO’s failure to respond to sea lice infestations emanating from farms and effecting young migrating salmon. Ridding fish farms of sea lice so as to protect young salmon is not a private problem that can be left to the farm operators to handle.

Dithering and Denial

Fish farms operations lay waste to the fish habitat in the vicinity of a farm, with food and fish wastes. Chemical therapeutants contained in the fish food are regularly introduced into the marine environment without any real knowledge of the their impact and without any regulatory framework established under the *Fisheries Act*. For example, sea lice are a serious problem for farm operations on the Atlantic and Pacific Coasts, yet no drug has ever been licensed for general use. Emergency Drug Release procedures have been continually relied upon in the absence of an licensed drug.

The current drug of choice, emamectin usually marketed under the trade name Slice, can legally be acquired for emergency use only. In Canada the Emergency Drug Release procedures were used 156 times in 2001 and 170 times in 2002. In British Columbia alone hundreds of millions of fish have been treated under the emergency procedures by a drug that has never undergone an environmental assessment with regard to its effect on wild fish and shell.

Very little information is available on the environmental fate and ecological effects of the drug in the marine environment. The organisms most likely to be affected by emamectin are those closely associated with the sediments below the net pens as the drug has low water solubility and a high potential to be absorbed and bound to suspended particulate material. Much of the emamectin reaching the sediments will be associated with

particulate material in the form of fish faeces and uneaten fish food. It remains in the sediments for a considerable period of time, having a half life (i.e. the time taken for the concentration to diminish by 50 percent) of around 175 days. It is likely to prove hazardous to shellfish.

A 2002 paper by DFO scientists, *Emamectin Benzoate Induces Molting in American Lobster*, revealed what many fishermen had long feared: the drug has severe side effects on lobsters. Seventy-eight percent of lobster molted after ingesting the chemical and eighty-nine percent of female lobster aborted their eggs. The scientists concluded: "Our results provide conclusive proof that emamecitn benzoate is disrupting the endocrine system that controls molting in the American lobster."

Prawn fishermen in British Columbia have noted problems that may well be linked to emamectin or related drugs used by fish farms. A Ladner, British Columbia Jeff Mikus prawn fishermen reports that:

> "Anytime we get close to a fish farm, we don't catch anything... I used to pull up small crab, shrimp, prawns, starfish, the occasional octopus, now we get absolutely nothing.

Another fishermen Bob Cameron observed that:

> "It has been my experience that the closer I fish to a salmon farm the less yield I will get from my traps. I think that this is significant because salmon farms are typically located at the mouths of creeks and small rivers — these are normally areas one would expect high prawn habitat."

The *Material Safety Data Sheet* prepared by the Schering-Plough, the manufacturer of the drug, states that emamectin is toxic to mysid shrimp at 0.043 parts per billion and warns that this product is "very toxic to aquatic organisms."

The Oxford University's "*Safety Data for Emamectin Benzoate*" states:

> "'Very toxic to aquatic organisms'. Toxic to bees. May cause long-term adverse effects in the environment. This material does not move rapidly through the environment, as it tends to absorb on soil particles. Half-life in the environment estimated at 8-15 months."

The report by the Veterinary Medicines Evaluation Unit of the European Agency for the Evaluation of Medicinal Products, an agency of the European Union, indicates that "clinical signs of toxicity together with degeneration of the brain, spinal cord, sciatic nerve were observed at all dose levels" in rats. While farms are supposed to withdraw the chemical from the salmon sixty days prior to slaughter, it is not clear how the Department enforces this prohibition as it has failed to enact regulations under the *Fisheries Act*. Nor is it clear how the Department can protect those who might catch and consume lobster or prawns in the vicinity of fish farms while the chemical is present in the nearby marine environment. The Committee heard evidence that DFO had advised

aboriginals who normally relied on prawns for food not to eat those caught in the vicinity of fish farms. The European Union report indicated that “no data concerning the potential effects in humans were available.”

As this drug is toxic to prawn, lobster and other shell fish, its use would be prohibited by section 35 of the *Fisheries Act* in areas where there is prawn, lobster or other shell fish habitat. DFO, as regulator and protector of wild fish and their habitat, would be obligated to inform Health Canada of its concerns; yet it seems that DFO as promoter of aquaculture has failed to advise the drug regulator of legitimate fish habitat concerns about the drug.

The drug is only partially effective in eliminating sea lice from caged salmon.

Prostituting Science and Environmental Assessments: The Broughton

Fish density is a key variable in fish health, disease, parasites, and the need for the use of chemical therapeutants. There are no regulations under the *Fisheries Act* to govern this key variable. Nor are there any regulations with regard to the number of fish, cages and the like that may be located in a single bay or waterway, that takes into account the load capacity of the surrounding area.

Given its conflicting priorities of promoting aquaculture and of protecting wild fish and their habitat, the Department has been unable to establish an effective environmental assessment criteria having as its first priority the protection of wild fish and their habitat. Each application is considered in isolation without regard to the carrying capacity or ability of an interdependent area, like the Broughton, to safely handle the number of farms that have been allowed to operate.

For example a farm site at Doctor Islet in the Broughton was approved in September 2001 despite the fact a that serious sea lice infestation was identified in the Broughton in the previous spring. Navigable Waters staff who approved the site had been informed that DFO scientists gave the Broughton a clean bill of health.

The Department expressed public confidence in its scientific studies which contradicted the findings of researcher Alexandra Morton. They claimed their research confirmed that fish farms were not the source of the sea lice infestation. Internal memos tell a different story. The Department knew from the outset that its studies were unreliable, that they had been conducted in the wrong place, at the wrong time and used the wrong methods.

A July 10, 2001 document advised: “Given the significant amount of scale-loss in the samples and the very tenuous attachment of the juvenile louse to the fish host ... this trawl sample potentially severely underestimates the louse numbers.”

A July 11, 2001 document expressed further doubts: “Had these fish been caught in a scientifically sound manner I would call this a normal parasite load but, given the method that was used, I won’t say anything.”

Fisheries Minister Thibault was advised on April 5, 2002 how to answer questions on this issue. He was advised to say, based on the DFO scientific study, that there was no sea lice problem in the Broughton. In effect, the Minister was advised to mislead Parliament:

> “My department conducted two surveys in 2001 in the area where sea lice concerns had been reported. Based on these studies, there was no indication of a threat to the wild salmon population. Juvenile pink, chum, and coho salmon collected in the two surveys were in very good condition and had normal levels of infestation.”

In addition he was advised to say that “there are no studies that indicate transfer of sea lice from farmed to wild salmon.”

However, sea lice studies in Ireland, Scotland and Norway have systematically found that sea lice numbers dramatically increase with the addition of fish farms, often decimating young salmon and sea trout and eventually precipitating the collapse of the stock.

James Butler in *Wild Salmoniods and Sea Louse Infestations on the West Coast Of Scotland: Sources of Infections and Implications for the Management of Marine Salmon Farms*, states that “louse infestations in salmon-farming areas of Norway cause the mortality of 30-50% of sea trout smolts and 48-86% of salmon smolts.” Butler further states: “In Norway and Ireland, declines in wild salmonoid stocks in farming areas have been linked to elevated louse infestations emanating from salmon farms. A similar situation is evident in Scotland, where wild salmon and sea trout rod fisheries have declined markedly in the west coast salmon-farming zone.” In Norway, he notes, “escapees are estimated to produce six times as many lice larvae as wild salmonoids, and are a major confounding factor in louse control initiatives.”

The farm at Doctor Islet continues to operate in the Broughton. A thorough review of the initial approval has not been undertaken. In addition, with full knowledge of the potential problems, a new site at Humphrey Rock was approved in March 2003 in the Broughton.

What Compromised the Department?

The Department is compromised by its conflicting obligations to act as both the regulator and promoter of aquaculture.

In 1995, Cabinet endorsed the Federal Aquaculture Development Strategy that committed DFO, the protector and regulator of the public fishery — to become DFO, the

aquaculture promoter. To comply with the Aquaculture Development Strategy, the Department has put in place an Aquaculture Policy Framework to ensure DFO would discharge its responsibilities in a manner that adheres to the following policy principles:

- "DFO will ... provide aquaculturists with predictable, equitable and timely access to the aquatic resource base."

- "DFO will strive to ensure that its own legislative and regulatory frameworks enables the aquaculture sector to develop on an even footing with other sectors."

- "DFO will make every effort to understand the needs of the aquaculture industry and to respond in a manner that is ... supportive of aquaculture development."

The aquaculture policy stated that, "creating enabling conditions for aquaculture development is the responsibility of all DFO sectors and regions." Giving effect to policy would require, "the review of current applicable legislative and regulatory frameworks, policies and programs to ensure they are consistent with this policy."

The policy made much of "DFO's reorientation" away from its historic role as regulator and protector of the public fishery: "Achieving DFO's vision of aquaculture development will require a continued reorientation of departmental values ... and a firm commitment by all DFO employees to enable aquaculture development." While constitutionally and statutorily the Department was charged with protecting and enhancing the public fishery and the right of navigation, it was now required to ensure that all of its assessments, regulations, policies and programs promoted aquaculture.

DFO's Aquaculture Policy is at odds with its constitutional and statutory mandate. No wonder the Department is only now starting to undertake environmental assessments as required by the *Environmental Assessment Act*, and has so far ignored the *Fisheries Act*. No wonder DFO scientists have avoided the problems associated with the interaction of fish farms and wild stocks or have felt coerced to participate in fraudulent investigations that would mislead the public.

The promotion of aquaculture ought to be transferred from the DFO so that the Department can get back to its core mandate, that of protecting the public fishery and fish habitat.

Healing the Beast: Is New Legislation the Solution?

If a crisis is to be averted, the *Fisheries Act* must be enforced and regulations must be developed to assist in the protection of wild fish stocks and their habitat from the impact of fish farms. A stable regulatory framework based on the requirements of the *Fisheries Act* and its underlying requirements to protect wild fish and their habitat would see the Department create regulations that deal with the impacts on the marine environment.

However the Department sees the need for new legislation — either a new stand-alone *Aquaculture Act* or substantive amendments to the *Fisheries Act*. The "key drivers for change" according to the Department are the need to modernize fisheries management and to provide access for the "aquaculture industry." Internal documents indicate the Department believes that its legislative agenda requires "building relations" with the Fisheries Committee to ensure "success" — in other words, to ensure the Committee is managed as a lapdog to get a report that recommends either a stand-along *Aquaculture Act* or rewriting of the *Fisheries Act*.

It is vital that the regulatory framework and environment for aquaculture be based on the *Fisheries Act* and be respectful of it. The present regulatory chaos and the crisis that has occurred in our coastal waters has occurred as a result of a failure to utilize the *Fisheries Act* rather than due to any deficiency in the Act. While it is natural that proponents of fish farms within DFO might wish to avoid the strictures of the Act and to join with the Department in advocating an *Aquaculture Act,* to do so is to disregard the fundamental constitutional basis for the Department and for the *Fisheries Act*.

It would be unconscionable to advocate a federal *Aquaculture Act*. One can only assume that those who would have forgotten the reason the Department and the *Fisheries Act* exists and have therefore decided that it is expedient to dispense with the public fishery and the fish stocks upon which the commercial and recreational salmon fishery relies upon.

When Mr. Fraser was asked if new aquaculture legislation would resolve the present problem with regard to aquaculture, he left little doubt as to his position:

> "I do not know whether an aquaculture act would be the appropriate approach ... but I can say that there is active concern among people who are paying attention to this issue in British Columbia, that the Department of Fisheries and Oceans has itself in the unenviable position of *pushing aquaculture*, and the impression is that those who are concerned about the interrelationship between aquaculture and its possible negative effects on wild salmon *are being pushed out of the picture*, and that the drive to develop aquaculture ..., that is, jobs, and its activity, has resulted in a situation where, when people turn to DFO for answers or action to protect the salmon, they do not know whether they are dealing with a department which is more interested in an aquaculture development than it is in protecting wild salmon.
>
> There it is in a couple of sentences. ... I think this needs attention because it is a question of confidence in a great federal institution.
>
> ... When the appearance among citizens is that the balance has slipped and that there is more attention being paid to promoting aquaculture and not enough being paid to ensure that it is being done in such a way that the wild salmon are considered to be the first priority, then you have a problem in confidence. When we have a lack of confidence in any great federal institution ..., it does a lot of damage to democracy. It does a lot of damage to our political system, but it does something else. It does a lot of damage to the fish."

Resolution

> "In the area of management, we urge DFO to exercise its constitutional conservation responsibilities and not abrogate its stewardship of resources under federal jurisdiction."
>
> **Hon. John Fraser, Report of the Fraser River Sockeye Public Review Board**

What brought DFO so close to disaster's door?

The Department has been corrupted by an aquaculture development strategy whose mission has turned it into a vehicle for aquaculture promotion.

In its rush to promote aquaculture, the Department has lied to its Minister, advised him to lie to Parliament and lied to the public.

Honestly administering century old statutes and telling the truth only becomes onerous when there is a fundamental and overriding conflict.

Ensuring that fish farms do not harm wild fish and their habitat will be difficult. It has not been easy or always successful in Norway, Scotland and Ireland but they at least no longer deny there is a problem. They are addressing the problem.

The first step to ending the corruption of the Department of Fisheries and Oceans is to remove the aquaculture promotion policy and responsibilities from the Department. These are fundamentally at odds with the mandate given it by Parliament and the Constitution. Protecting the public fishery, wild fish and their habitat must once again become the primary focus of the Department.

The next step is to reject the notion we need a new *Aquaculture Act* or a wholesale rewriting of the *Fisheries Act*. It seems clear from a careful reading of John Fraser and the Auditor General that the problem is a failure to administer the *Fisheries Act* and the *Navigable Waters Protection Act* rather than a failure in these laws. Neither saw new legislation as the solution.

The *Fisheries Act* should be used to establish a stable and transparent regulatory framework for aquaculture operations in the marine environment for the purpose of protecting wild fish and their habitat. Regulations should reflect the following concerns:

(1) Regulations must be clear, unambiguous, enforceable and able to achieve the desired results. The Pacific Fisheries Resource Conservation Council has advised Parliament against the use of "performance based" or "results based" regulation: "We are concerned about its use in preventing damage to fish habitat ... we do have a results based waste management regulation for net pen aquaculture. That regulation sets standards that fail to protect the ocean

bottom from damage caused by fish food pellets and faeces from the farmed salmon." The Council references a 2002 DFO study, entitled *A Perspective on the Use of Performance-Based Standards to Assist in Fish Habitat Management on the Sea Floor Near Salmon Net Pen Operations in British Columbia*, that "concludes that the proposed results based standards appear to be insufficient to prevent loss of productive capacity on mud habitats in the vicinity of net pen aquaculture sites."

(2) Regulations must prohibit the use of genetically altered farmed fish in the marine environment.

(3) Regulations must address the density of fish in net pens, as density is the key variable with regard to the spread of disease and parasites and the need for drugs and various chemicals to control such disease and parasites.

(4) Strict regulations must be enacted to prevent the escape of farmed fish into the marine environment and to provide dependable arrangements for the reporting of escapes. A public registry would be maintained by DFO of the escapes.

(5) Regulations must be enacted with regard to the siting of net pens. Such regulations would establish zones where farms would be prohibited, for example, at the mouth of salmon streams and would allow for fish farms in bays and inlets consistent with the carrying capacity of that body of water.

(6) Regulations would have as their objective the elimination at farm sites of sea lice from areas known to be frequented by young salmon, bearing in mind the advice from the Pacific Fisheries Resource Conservation Council that "of all the fish health issues considered ... sea lice from fish farms constitute the most serious and immediate risk." During the period when young salmon (smolts) are known to be in the vicinity, there will be zero tolerance for such sea lice.

(7) Regulations would require the reporting of incidences of disease, the presence of parasites and all drugs and chemical treatments used to treat or prevent the same. All such information would be available to the public in a public registry maintained by DFO.

(8) Regulations would require the monitoring and control of effluents including food and faeces, and chemicals or medical treatments that are released in the marine environment from fish farms.

The purpose of the regulations would be to ensure the protection of wild fish and their habitat in a manner consistent with the *Fisheries Act*. Such regulations are intended to be consistent with the federal government's exclusive responsibilities for fisheries and the marine environment under the Constitution.

Science has not been used to its best advantage to inform decision-making. That must change.

In a January 2003 advisory to the Minister, the Pacific Fisheries Resource Conservation Council made a number of helpful observations and recommendations regarding renewing DFO and what a renewed DFO might look like:

(1) DFO must undertake a wide-ranging research and monitoring program on wild/farmed salmon interaction and develop means and practices to mitigate farming impacts.

(2) DFO must proceed immediately to formulate and implement a comprehensive wild salmon policy that explicitly states that wild salmon will be given priority in government decision making.

(3) DFO's management of the wild salmon resource is hampered by uncertainty about the extent of disease risks and other possible aquaculture impacts.

(4) DFO ought to redirect the focus of research and monitoring onto issues associated with interactions of salmon farming and wild salmon.

(5) DFO is obligated to act on its duty and responsibility to protect wild stocks and maintain their habitat.

(6) DFO should be pro-actively scanning and analysing the issues as they develop, rather than waiting for serious or irreversible harm to be inflicted on wild salmon stocks.

(7) DFO must be open and transparent in decision-making on salmon farm siting approvals.

These are not simply platitudes for another day, as Gordon Ennis of the Pacific Fisheries Conservation Council said in testimony before the House of Commons Fisheries Committee on February 25, 2003:

> "Now is not the time to simply collect more research and do more monitoring. We believe doing more research and monitoring is important, but more than that, at this time, we believe that action has to be taken."

We agree. Now is not the time to simply collect more research and to do more monitoring; now is the time for action. There must be a house cleaning in the Department that shakes loose those who have undermined DFO's legitimate work those would prevent a return to a fish-based administration of the *Fisheries Act*.

MINUTES OF PROCEEDINGS

Tuesday, March 25, 2003
(*Meeting No. 24*)

The Standing Committee on Fisheries and Oceans met *in camera* at 11:13 a.m. this day, in Room 536, Wellington Building, the Chair, Tom Wappel, presiding.

Members of the Committee present: Andy Burton, John Cummins, Reed Elley, Georges Farrah, Loyola Hearn, Bill Matthews, Carmen Provenzano, Jean-Yves Roy, Peter Stoffer, Tom Wappel, Bob Wood.

In attendance: *From the Library of Parliament*: François Côté and Alan Nixon, research officers.

Pursuant to Standing Order 108(2), the Committee resumed its study on aquaculture in Canada *(See Minutes of Proceedings, Thursday, November 7, 2002, Meeting No. 2).*

The Committee resumed consideration of a draft report.

It was agreed, — That the draft report, as amended, be adopted.

It was agreed, — That the Committee append to its report, after the signature of the Chair, dissenting and/or supplementary opinions from the Canadian Alliance, the Bloc Québécois and the New Democratic Party provided that they are no more than 40% of the length of the report and that they are submitted electronically to the Clerk of the Committee in both official languages, no later than 5:00 p.m., on April 4, 2003.

It was agreed, — That the Chair, Clerk and researchers be authorized to make such grammatical and editorial changes as may be necessary without changing the substance of the report.

It was agreed, — That the Chair present the report to the House.

It was agreed, — That, pursuant to Standing Order 109, the Committee request the government table a comprehensive response to the report; however, notwithstanding the deadline of 150 days stipulated in Standing Order 109, the Committee request that the comprehensive response to this report be tabled within 90 days of the presentation of the report to the House.

Pursuant to Standing Order 108(2), the Committee resumed its study of the implications of extending Canada's exclusive economic zone to include the Nose and Tail of the

Grand Banks and the Flemish Cap (*See Minutes of Proceedings, Thursday, November 7, 2002, Meeting No. 2)*.

It was agreed, — That the Committee authorize the Chair to send a letter to his counterparts in NAFO countries, along with copies of the Committee's second report in this session and the Committee's 10th report in the first session of the 37th Parliament.

At 11:51 a.m., the Committee adjourned to the call of the Chair.

Jeremy LeBlanc
Clerk of the Committee