



THE SENATE OF CANADA

**THE MARKETING OF FISH
IN CANADA**

**AN INTERIM REPORT ON THE
WEST COAST FISHERIES**

INTERIM REPORT II

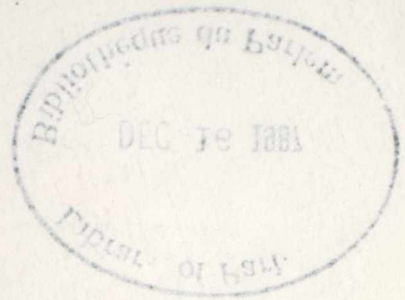
Standing Senate Committee on Fisheries

December 1987

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* The Honourable Senators Bonnell, Petten, Phillips and Simard also served on the Committee at various stages.

ORDER OF REFERENCE

Extract from the *Minutes of the Proceedings of the Senate*, on Tuesday, October 28, 1986:

“Pursuant to the Order of the Day, the Senate resumed debate on the motion of the Honourable Senator Marshall, seconded by the Honourable Senator Murray, P.C.:

That the Standing Senate Committee on Fisheries be authorized to examine all aspects of the marketing of fish in Canada, and all implications thereof;

That the papers and evidence received and taken on the subject before the Committee during the 1st Session of the 33rd Parliament be referred to the Committee; and

That the Committee report no later than September 15, 1987.*

After debate, and —

The question being put on the motion, it was —

Resolved in the affirmative.”

Charles A. Lussier

Clerk of the Senate

* By order of the Senate dated March 31, 1987, the date of tabling the final report was extended to March 31, 1988.

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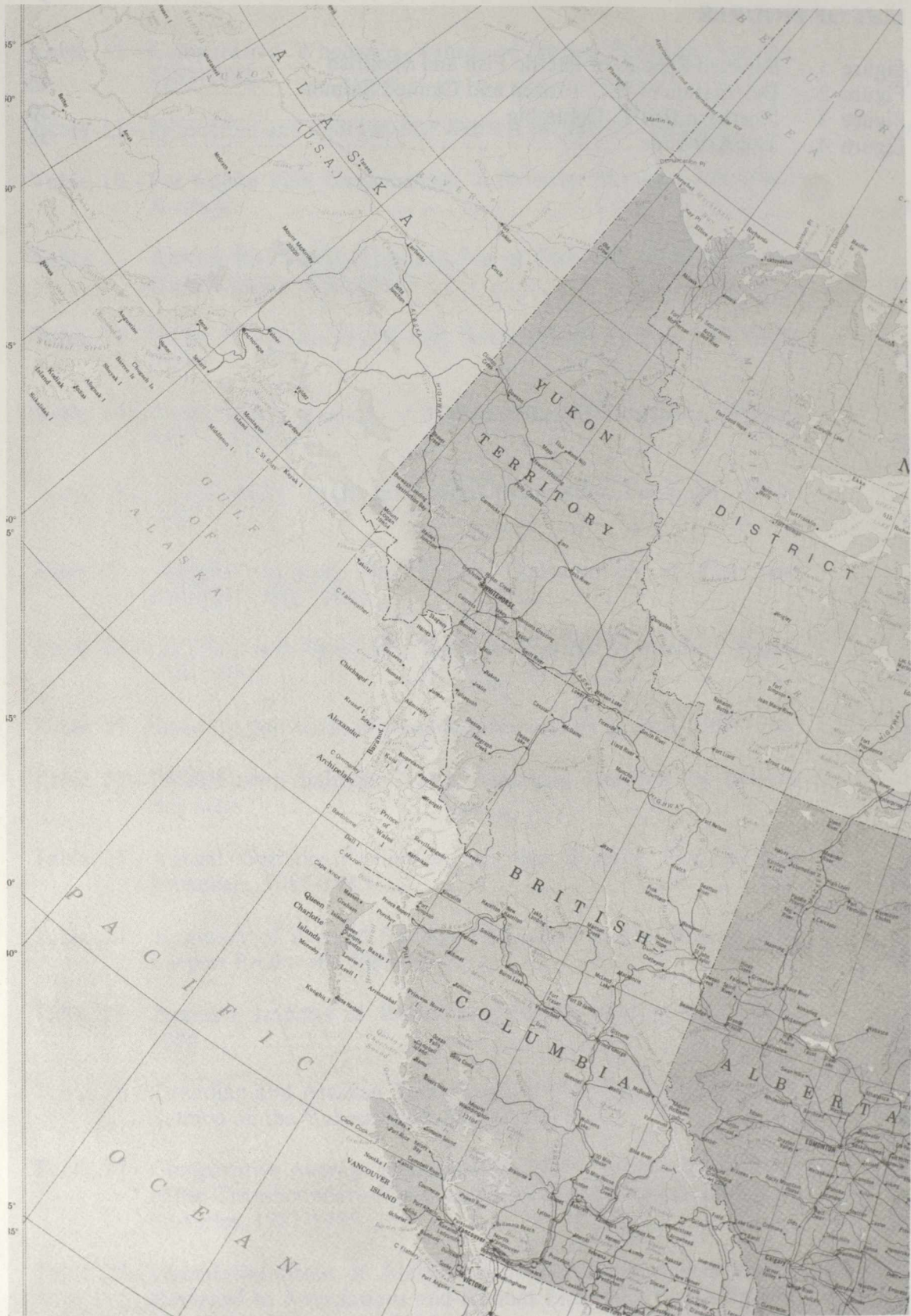
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Source: Canada, Department of Energy, Mines and Resources, Surveys and Mapping Branch, Map MCR 15 (Canada), 1970

PREFACE

On 6 February 1985, the Standing Senate Committee on Agriculture, Fisheries and Forestry was given an Order of Reference pertaining to a study of the marketing of fish in Canada and all implications thereof. On 14 May 1986, that Committee was divided into two separate committees, the Standing Senate Committee on Agriculture and Forestry and the Standing Senate Committee on Fisheries. As a result, the above Order of Reference was referred to the Standing Senate Committee on Fisheries on 12 June 1986.

A report which focused on the freshwater fisheries was published in September 1986. This second interim report addresses the key elements that affect the marketing of West Coast fishery products. Numerous testimonies and submissions concerning the resource, the harvesting, processing, handling and eventual selling of the finished products were presented by a well balanced mix of government and industry representatives.

Official studies and reports of the West Coast fishery were used to complement the information supplied by the Department of Fisheries and Oceans and the Department of External Affairs, while the B.C. provincial and the Yukon territorial governments provided fisheries catch and production statistics. The Committee also obtained information from informal meetings with groups such as the Sports Fishing Advisory Board, from a forum of Alaskan government and industry representatives, and from municipal organizations, as well as from visits to seafood markets, the Boston Seafood Show, hatcheries and research facilities.

The Standing Senate Committee on Fisheries is indebted to those organizations and individuals who contributed so effectively to this phase of the study. The flow of information and communication was ably facilitated by the Clerk of the Committee, Mrs. Diane Deschamps, with the assistance of Miss Laura Fox. The Committee also acknowledges the efforts of its research team, consisting of Mr. Vince Gobuyan, Director of Research of the Committee and Mr. Claude Emery, Research Officer, Library of Parliament, in the conduct of the study and the subsequent preparation of the report.

In this study we have identified the changes needed in the industry in order to expand the markets for West Coast fishery products. It is our view that under current market conditions the industry will be responsive to new ideas for improving its performance. We are hopeful that our recommendations will lead to the further growth, stability and long-term prosperity of Canada's fishing industry and increasing use of its resources.

FOREWORD

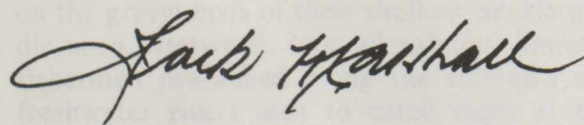
The West Coast fisheries have clearly recovered from the negative economic circumstances which troubled them in the early 1980s. Stocks of the major species are healthy and prospects for expanding them are encouraging, while the nutritional and health benefits of eating fish have undoubtedly aroused strong consumer interest. Overall, markets for seafood products have never been better, so that access to more supply is the trade's main concern.

As pointed out in our first interim report, however, this is not a time for complacency, but rather prudence, since historically the industry has been vulnerable to drastic market fluctuations. In the meantime significant developments are taking place in the production and marketing sectors that will increasingly affect Canada's fishing industry in the coming years. Among these are the development of aquaculture, the alarmingly rapid increase in seafood imports and the introduction of new lower value species into the principal markets for West Coast products.

Focusing on marketing, this report examines all these issues, as well as other key aspects of the fishing industry in the West Coast region.

Accordingly, the Committee now presents, for consideration by industry and the federal, provincial and territorial governments, its recommendations for enhancing the domestic and export marketing of West Coast fishery products. These recommendations are broad in scope and their application would require profound deliberation by all concerned. In particular, it is hoped that their implementation will spur the development of the domestic market, thus making more West Coast fishery products available to more Canadians.

The Committee is aware that, although much has been accomplished, much remains to be done. Accordingly it is looking forward with enthusiasm to carrying out the next stage of its mandate.



Jack Marshall
Chairman

December 1987

CHAPTER ONE

The Resource

AN OVERVIEW

A. Salmon

The cycle begins and ends in some 2,000 streams along the length of Canada's West Coast. The region's five indigenous species of wild salmon — the pink, the sockeye, the chum, the coho, and the chinook — hatch in freshwater, where the parr remain for a period of time depending on the species or stock. The juvenile salmon later migrate to the North Pacific ocean, where they spend most of their adult lives. Not all young fish reach saltwater, however, since some are killed by natural predators, and others by pollutants in the water.

Salmon, particularly sockeye, pink and chum, are known to cover vast distances in the sea, mainly to feed on shrimp, squid and small fish. The migration of salmon is generally to the north on their outward journey, but from the south on their return. What happens to the fish in the open ocean is still very much a mystery, although it is known that Canadian stocks mingle with other schools of salmon originating in rivers in Japan, Siberia, Alaska, Washington, Oregon and northern California. On their journey back to freshwater to spawn, salmon are believed to remember and follow the odour of their natal stream. As the fish travel upstream, they cease to feed and live off their body stores of fat and protein. Their bodies alter dramatically through hormonal changes and assume various spawning colours. Travelling through swift and opposing currents and waterfalls, encountering predators along the way, the fish arrive battered on the gravel beds of their shallow, ancestral streams where they pair off to spawn and die soon afterward. Not all salmon, however, are able to return to their riverbeds; fishermen positioned along the salmon's ocean path and at the coastal mouths of freshwater rivers seek to catch them at the prime of their life, before they enter freshwater. Salmon, particularly sockeye, are also harvested up-river in freshwater, and constitute an important food source for the native population of the region.

As shown in Figure 1 at the end of this section, each of the five species of Pacific salmon differs in terms of life cycle, size, productivity, dependence on freshwater

habitat, behaviour and susceptibility to fishing gear.⁽¹⁾ Flesh colour, oil content and flesh texture are other distinguishing characteristics. Some species, such as sockeye, are preferred by consumers, while others, such as chum, are not as valued. Salmon, like other fish species on the West Coast, are known by a variety of common or local names. For example, chinook salmon is also called the king, tyee, spring or blackmouth (Appendix A).

The Salmonid Enhancement Program, a federal government initiative in existence since the mid 1970s and jointly funded with the province of British Columbia, complements the natural production of salmon by using a wide range of enhancement techniques, such as hatcheries, fish wheels, and spawning channels. As well, recent developments in aquaculture have expanded the region's resource base of coho and chinook salmon.

B. Other Species

Pacific herring is one of the most abundant of the 250 or more species of fish which inhabit the waters of Canada's Pacific region. Although they are distributed on the continental shelf and inshore waters of the North Pacific from Mexico to Korea, the centre of abundance in the eastern Pacific is the coast of B.C. Seven major stocks are known to migrate from offshore feeding grounds in the North Pacific Ocean into the shallow coastal bays and inlets of B.C. to spawn in the spring, three along the northern coast and four along the southern coast. These small pelagic fish, which swim in schools, are believed to be an important source of food for other fish species, such as Pacific cod, Pacific hake and sablefish.⁽²⁾ Herring eggs and larvae are also the prey of other animals; on average, only one of every 10,000 eggs laid is destined to become a mature spawning adult.⁽³⁾

Although, because of a narrower continental shelf, the groundfish resource on the West Coast is smaller than that of the East Coast, some 25 species are of commercial importance: rockfish, Pacific hake, Pacific cod and other cod-like fish, spiny dogfish, and a variety of flatfish such as sole and halibut.

The coastal waters of B.C. also support a variety of minor fisheries based on about 26 species of invertebrates,⁽⁴⁾ or shellfish, as they are commonly known. These can be classified into three groups: crustaceans, such as crabs, shrimps and prawns; molluscs, such as clams, mussels, oysters, scallops, abalone and squid; and echinoderms such as sea urchins and sea cucumbers. Oyster culturing, which first began at the turn of the century, is a well-established industry, and new mariculture techniques are currently being evaluated and developed for other invertebrate species as well.

⁽¹⁾ Peter H. Pearse, *Turning the Tide: A New Policy for Canada's Pacific Fisheries*, Final Report, The Commission on Pacific Fisheries Policy, Vancouver, September 1982, p. 10.

⁽²⁾ Department of Fisheries and Oceans, Pacific Biological Station, brief submitted to the Chairman, 9 February 1987, p. 15.

⁽³⁾ Department of Fisheries and Oceans, "Underwater World: Pacific Herring," Supply and Services Canada, 1987, p. 3.

⁽⁴⁾ Pacific Biological Station (DFO), brief, p. 11.

MANAGING THE RESOURCE

A. The Role of Government

The Department of Fisheries and Oceans (DFO) carries out the federal government's responsibilities for inland and sea coast fisheries. The basic statute administered by DFO is the *Fisheries Act*, under which regulations are made for fisheries management, including the patrol of coastal waters, the protection of fish life and streams, etc. The *Coastal Fisheries Protection Act* empowers the federal government to control the conduct of foreign fishing vessels in Canadian territorial waters, and the *Fish Inspection Act* provides for control of the quality of fishery products. The Department's mandate encompasses all saltwater fish, including invertebrates and marine mammals such as whales, seals and sea lions. Although the province of B.C. has delegated responsibility for managing the freshwater fisheries within its boundary, because of the anadromous nature of salmon,⁽¹⁾ DFO's mandate extends to all five species, even in freshwater. In the Yukon, DFO manages both the freshwater and salmon resources.

The Department divides its responsibilities in the Pacific Region among three divisions: the North Coast, covering the north and central coast of British Columbia and the Queen Charlotte Islands; the South Coast, covering Juan de Fuca and Georgia Straits and the west coast of Vancouver Island; and the Fraser River-Northern B.C.-Yukon Division, which includes the Fraser River, the transboundary rivers of northern B.C. and the Yukon River.

DFO's main objectives are to conserve the resource and to develop and maintain the economic and social benefits of the fisheries. For the major fish species in the region, this is achieved largely by allocating the resource among competing users and by controlling harvests so that sufficient numbers of spawning fish are allowed to return to spawning grounds. As pointed out by the Auditor General's recent audit of the Pacific fishery, the cornerstone of the management effort on the coast is real-time or in-season fisheries management, which is reflected in the Department's field services expenditures (Table 1).

TABLE 1
DFO PACIFIC REGION BUDGET, 1985-1986
(\$ Millions)

Field Services	35.2
Salmon Enhancement	35.3
Science	14.0
Small Craft Harbours	8.4
Other	17.8
<hr/>	
Total	110.7

Source: Auditor General, *Report*, fiscal year ended 31 March 1986, Supply and Services Canada, 1986, Exhibit 10.1.

⁽¹⁾ Other fish stocks, such as steelhead and cutthroat trout, are also anadromous.

DFO's varied activities include administering the Salmonid Enhancement Program, maintaining and developing a large network of harbours, administering hydrographic surveys, inspecting fish holding systems, and processing plants and fish products to ensure their wholesomeness for human consumption.⁽¹⁾ The Department must coordinate its activities with those of a number of other federal departments such as Environment, Indian Affairs and Northern Development, and Transport. Cooperation with other countries is also required: DFO participates, with the Department of External Affairs, in various bilateral and multilateral forums such as the Pacific Salmon Commission, the International North Pacific Commission, and the International Pacific Halibut Commission.

B. The Salmon Fishery

Regional headquarters in Vancouver and 10 district and 50 sub-district offices manage the fishery by preparing annual fishing plans, issuing fishing licences, protecting fish habitat from damage, and assessing the condition of spawning beds for salmon. During the salmon fishing season, district supervisors set opening and closing times for fishing, supervise enforcement, gather information, and meet with the various fishing groups.

Managing the salmon fishery is an exceedingly complex undertaking. If not strictly controlled, fishing could eliminate entire stocks in one season. Setting escapement targets for returning salmon is a problem, because it is difficult for fisheries managers to forecast accurately the size and timing of salmon runs. Decisions that have major implications for fishermen or for the resource are often made quickly, sometimes in a matter of hours and on the basis of limited information.⁽²⁾ Some fisheries are opened for only short periods, sometimes only a few hours. The Department also determines the type of gear that can be used in a particular fishery and establishes fishery boundaries, especially in areas at the mouths of rivers.⁽³⁾ Some salmon stocks are small and support limited fisheries, while others are massive, with returning adult fish numbering in the millions. Each spawning stock, of which there are about 4,000, functions as a genetically distinct population, and must be managed separately to ensure conservation. This is difficult because different stocks often mingle and migrate together on the fishing grounds.

Adding to the complexity of resource management are the migratory patterns of the fish and the fact that many streams which support salmon in B.C. and in the Yukon originate in Canada and flow through United States territory. Thus, salmon of Canadian origin become subject to the fishing policies and regimes of coastal American states. In addition, Canadian stocks are sometimes intercepted by foreign fishing vessels outside Canada's 200-mile limit.

Salmon production is highly cyclical and fluctuates widely, with natural stocks estimated to have undergone an annual 1.5% decline over the years. It is also believed

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 7.

⁽²⁾ Auditor General, *Report*, fiscal year ended 31 March 1986, Supply and Services Canada, 1986, paragraph 10.54.

⁽³⁾ Department of Fisheries and Oceans, "Underwater World: Pacific Salmon," Supply and Services Canada 1987, p. 10.

that coho and chinook salmon stocks have generally been reduced through overfishing.⁽¹⁾

C. The Herring Fishery

The Department's management of the herring resource differs from its management of salmon: herring catch quotas are set and operational fishing plans are established within a fully integrated, centralized management system. As well, an area licensing scheme, introduced in 1981 for the roe herring fishery, establishes broad fisheries management zones along the coast, with quotas set in each. A herring research group recommends catch quotas (based on the biological status of the stocks) which are then discussed with fisheries managers and industry representatives in order to establish a fishing plan.⁽²⁾ Scientific assessments are made of when the roe level is at its optimum, and decisions on when the fish will be harvested are reached accordingly. Fishing is stopped once quotas are reached.

The herring fishery has been a major but turbulent, if not chaotic, activity in recent years. While herring stocks became seriously depleted in the 1960s, the subsequent closure of the fishery in 1967-1968, in combination with strict catch limits imposed after its reopening in the early 1970s, resulted in a recovery of the stocks. Landings reached an historic peak in the mid-to-late 1970s, but in subsequent years collapsed due to overfishing and biological factors. DFO's current management plan is to curtail commercial production to ensure that a roe herring harvest of about 30,000 to 35,000 tonnes is maintained.⁽³⁾

D. Other Fisheries

Management strategies for species of fish other than salmon and roe herring include gear restrictions, quotas, size limits and time and area closures. With the exception of Pacific ocean perch, and some stocks of sole, rockfish and ling cod, groundfish stocks are generally believed to be in good condition. Pacific halibut, the most highly esteemed of Pacific Coast groundfish, is a long-lived species, taking about eight years to mature and weighing up to 90 kg; the commercial harvest in Canadian and U.S. waters is therefore strictly regulated by the Canada-U.S. International Pacific Halibut Commission.

Because invertebrates are usually stationary, frequently hide from view, and are widely scattered, they are generally managed with relatively simple measures,⁽⁴⁾ such as limits on daily number caught and on size, and timed area openings and closures. A few local stocks of invertebrate species, particularly abalone and geoduck, are at present heavily exploited.

⁽¹⁾ Auditor General, *Report* 1986, paragraph 10.61.

⁽²⁾ Pacific Biological Station (DFO), brief, p. 7.

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, No. 2, 7 November 1986, p. 19.

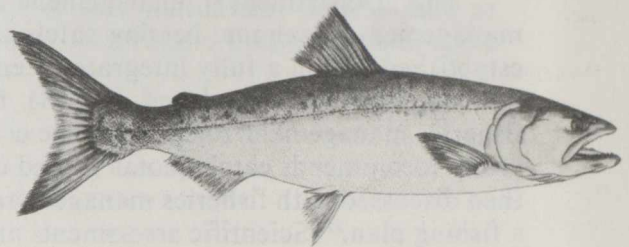
⁽⁴⁾ Pacific Biological Station (DFO), brief, p. 11.

FIGURE 1 — SELECTED SPECIES OF PACIFIC FISH AND SHELLFISH

COHO SALMON (*Oncorhynchus kisutch*)

General: The coho is predominantly silver in coloration, metallic blue to green on the back and silver on the sides, hence another common name, silver. The upper part of the tail usually has spots. The fish is also called medium red salmon, a name used in the European canned trade in reference to flesh colour, which is second only to sockeye in intensity. Typical weight of the coho is between 2 and 4.5 kg. It is largely harvested by trolling; seining and gillnetting methods are also used.

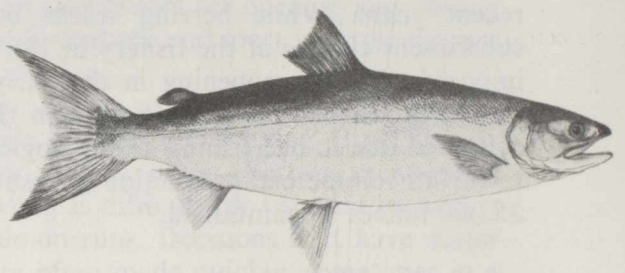
Principal landing season: July through October.



SOCKEYE SALMON (*Oncorhynchus nerka*)

General: One of five important salmon grouped as *Oncorhynchus spp.*, commonly referred to as Pacific salmon. It is also known as blueback and red salmon. The sockeye is silvery on the sides, shading to greenish blue on the back; the back has fine black specks. Caught mainly by seine and gillnet, and sometimes by troll, the fish weighs an average of 2.7 kg.

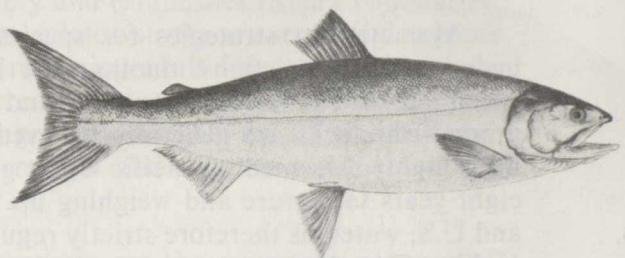
Principal landing season: June through September, with the major harvest in July.



CHUM SALMON (*Oncorhynchus keta*)

General: Other names for the chum salmon are keta salmon, dog salmon, qualla and silverbright. This anadromous fish is similar to sockeye in appearance, but is identified readily by the slimmer "wrist" above the tail. It is silvery on the sides, shading to metallic dark blue on the back. It has faint purple bars on the sides. This species is caught mostly by seine, and also by gillnet and troll. The typical weight of the fish is from 3.5 to 7 kg.

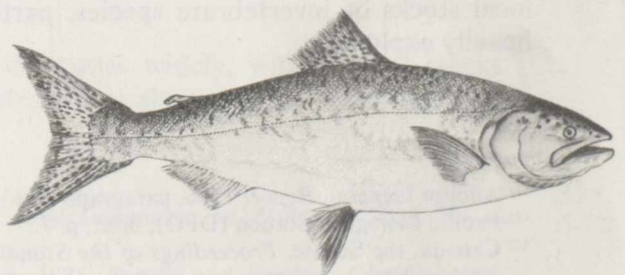
Principal landing season: July through November.



CHINOOK SALMON (*Oncorhynchus tshawytscha*)

General: This species, which is also commonly referred to as spring salmon, is the largest of the *Oncorhynchus spp.* group of five important species caught in North American waters and known collectively as Pacific salmon. It is silvery on the sides, and dark green to blackish on the back, with numerous small black spots on the tail fin. Like other Pacific salmon, the chinook is anadromous, and spawns in more than 150 streams and rivers along Canada's west coast. Other names commonly used for the chinook include king salmon and blackmouth. The typical weight range of the chinook is 4.5 to 22.5 kg. It is caught mostly by troll, and also by gillnet and seine.

Principal landing season: April through September.



PINK SALMON (*Oncorhynchus gorbuscha*)

General: This species, also commonly known as humpback, is the smallest of the Pacific salmon in North America. It is silver on the sides and dark blue on the back, and can be distinguished easily by large oval spots on the back and both lobes of the tail fin. Its typical weight is from 1.3 to 2.3 kg. It is harvested mainly by seine, although gillnet and troll are also used.

Principal landing season: July through September.

PACIFIC HERRING (*Clupea harengus pallasii*)

General: The Pacific herring ranges the North Pacific Ocean, with the Canadian harvest extending from Alaska southward. It roams the open ocean in huge schools, although spawning takes place in shallow bays close to shore. Formerly taken for reduction to meal and oil, this fish is now harvested for food and in particular for the production of roe. Caught by seine and gillnet, the fish is generally 15 to 17 cm long.

Principal landing season: Food fishery in the fall and winter months. The spring roe herring fishery supplies a growing Japanese market.

ROCK SOLE (*Lepidopsetta bilineata*)

General: The most important of Canada's smaller flatfishes of the west coast, rock sole is sometimes called roughback because of its rough back scales. A member of the flounder family *Pleuronectidae*, it is a favourite foodfish in many markets. Colour can be variable, mostly browns and greys. The rock sole is found in areas with pebble, shell, or sand bottoms, and is harvested by bottom trawl.

Principal landing season: All year.

CANARY ROCKFISH (*Sebastes pinniger*)

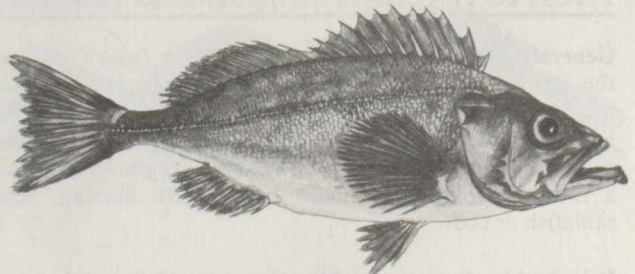
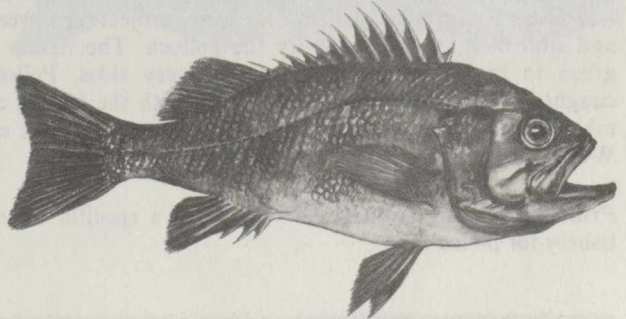
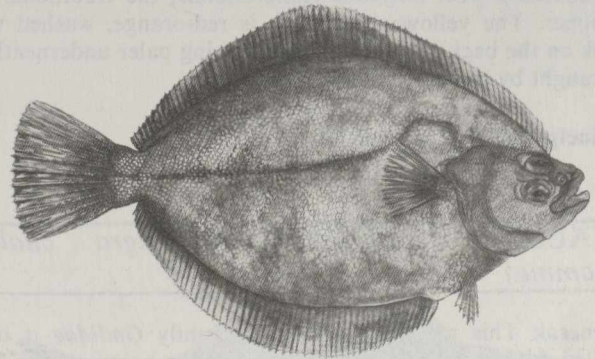
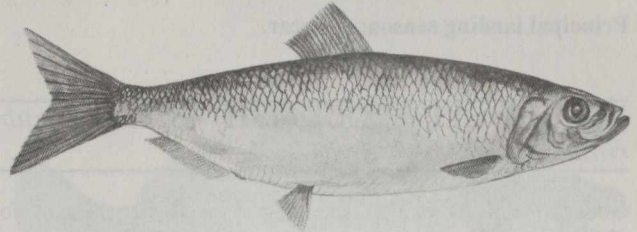
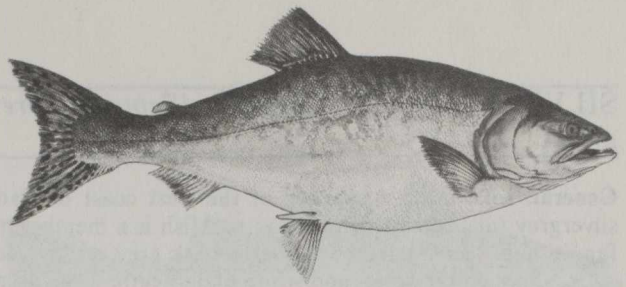
General: This member of the family *Scorpaenidae* is one of four rockfishes which have gained commercial interest on Canada's Pacific coast. The canary rockfish is sometimes called orange rockfish, a name it comes by quite naturally since it is bright orange mottled with grey, three orange stripes on the head, and orange on the fins. Large canary rockfish attain a length of 76 cm. This species is harvested by trawl.

Principal landing season: All year.

PACIFIC OCEAN PERCH (*Sebastes alutus*)

General: This is the most important of the west coast rockfishes harvested for market. Not really a perch, it is a member of the family *Scorpaenidae*. It has a projecting lower jaw and is bright red with olive stippling on the sides. It can reach up to 50 cm in length, 0.5 to 1.4 kg in weight. Pacific ocean perch is caught by trawl.

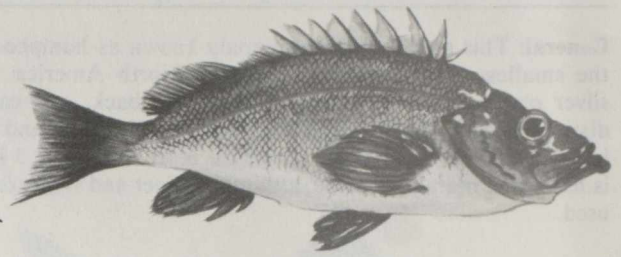
Principal landing season: All year.



SILVERGREY ROCKFISH (*Sebastes brevispinis*)

General: Like other rockfishes of the west coast of Canada, silvergrey (also spelled silvergray) rockfish is a member of the family *Scorpaenidae*. This species is dark grey or olive on the back, silver on the sides, and white underneath. The silvergrey comprises 11 percent of the total rockfish landings on Canada's west coast, and is harvested by trawl. The species grows up to 70 cm in length.

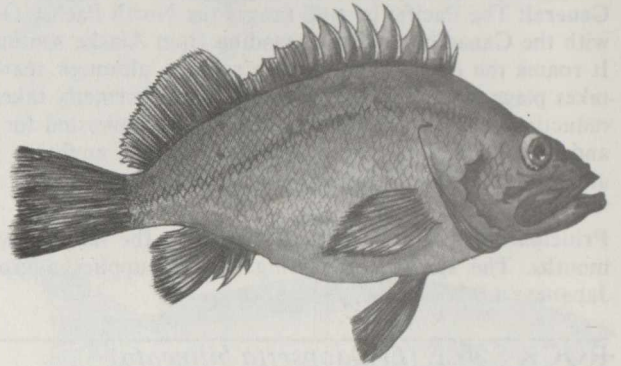
Principal landing season: All year.



YELLOWEYE ROCKFISH (*Sebastes ruberrimus*)

General: This is one of the largest of the rockfishes found along Canada's west coast, reaching a length of 1 m and a weight of 10 kg. Although it is also called Pacific red snapper, the yelloweye rockfish is in fact a *Scorpaenidae* and should not be confused with *Lutjanus campechanus*, the traditional red snapper. The yelloweye rockfish is red-orange, washed with pink on the back and sides, and becoming paler underneath. It is caught by trawl, longline and jig.

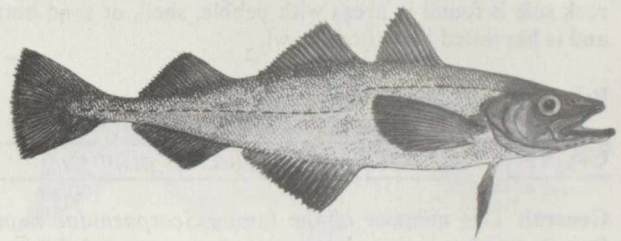
Principal landing season: All year.



WALLEYE POLLOCK (*Theragra chalcogramma*)

General: This member of the cod family *Gadidae* is often called Alaska pollock, or bigeye pollock, a name arising from the very large eyes of the species. Spelling in the United States and elsewhere can be pollack. Its eyes, projecting lower jaw and slim body, readily identify the pollock. The fish is olive green to brown on the back, with silvery sides. Pollock is caught by midwater and bottom trawl, with the largest catch taken in the more northerly regions of Canada's west coast. Weight range is between 680 and 900 g.

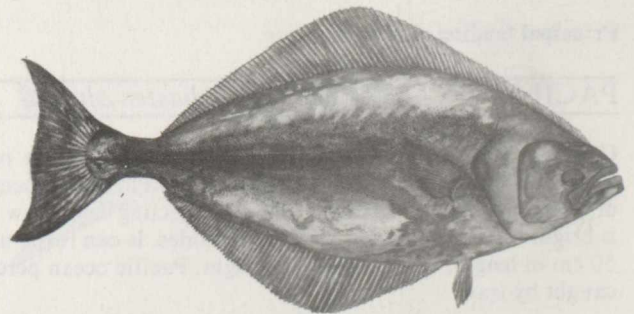
Principal landing season: All year, with a specific February fishery for pollock roe.



PACIFIC HALIBUT (*Hippoglossus stenolepis*)

General: Pacific halibut ranges the ocean from California to the Bering Sea, and the west coast catch is controlled by international agreement regulated by the International Pacific Halibut Commission of the United States and Canada. Its average landed weight is 16 kg and it is caught by longlining in a method which uses hooks baited with herring, octopus, sablefish or cod.

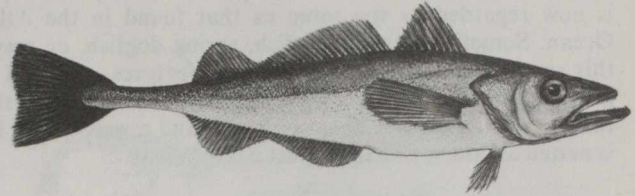
Principal landing season: May through mid-November.



PACIFIC HAKE (*Merluccius productus*)

General: A small member of the cod family *Gadidae* sometimes known as whiting, the Pacific hake is a slim fish with a slim "wrist" ahead of the tail. Typical size is 50 cm long with an average weight of 1 kg. Hake is semipelagic, roaming from ocean floor to midwater, and is caught by midwater trawl. Geographically, it ranges the North American coast from British Columbia southward to the Gulf of California.

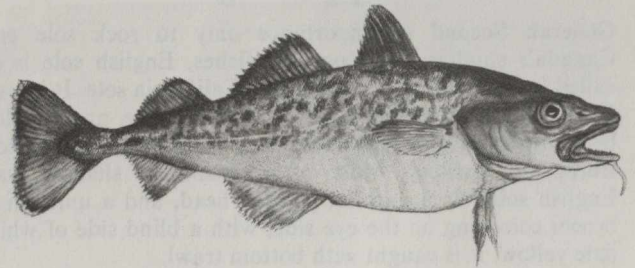
Principal landing season: June through October.



PACIFIC COD (*Gadus macrocephalus*)

General: One of the most desirable of the North Pacific Ocean's groundfish, the Pacific cod is also known as grey cod and true cod. It is brown to grey on back, lighter on the sides, with a belly shading grey to white, and has the typical chin barbel of the cod. Typically 50 to 70 cm in length, with a weight of 1.3 to 4.2 kg, the Pacific cod ranges the entire western coast of Canada and is harvested by bottom trawl.

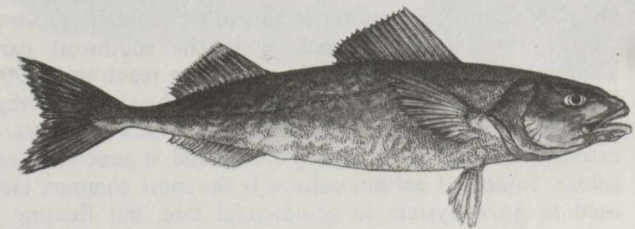
Principal landing season: All year, with best catches during spring and summer.



SABLEFISH/BLACKCOD (*Anoplopoma fimbria*)

General: Despite folk names, this species is not a true cod, belonging rather to the family *Anoplopomatidae*, which is restricted to the North Pacific Ocean. It is variously referred to by names like blue cod, bluefish, Alaska blackcod, Pacific blackcod, candlefish, coal cod, and coalfish. This is a streamlined fish, with two dorsal fins, the anterior of which is quite large. It is black or grey-black, on the back with a light grey underbelly. Typical size is 60 cm weighing 2.3 to 2.7 kg. It is harvested by trawl, longline, and pots in deep, cold water.

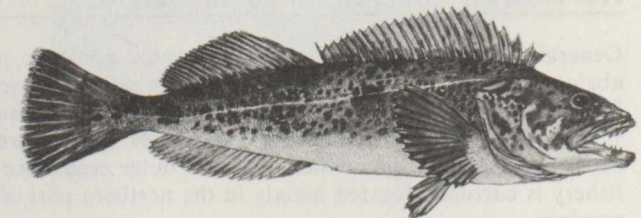
Principal landing season: Spring and summer.



LINGCOD (*Ophiodon elongatus*)

General: Lingcod is not a true cod, but a member of the family *Hexagrammidae*, the most commercially important of the greenlings. In varied markets and regions, it is called blue cod, buffalo cod, green cod, greenling, leopard cod, and cultus cod. It is sometimes spelled ling cod, although the one-word spelling is scientifically favoured. Unlike true cod, it is slender, with a long continuous dorsal fin, large mouth, and prominent teeth. It is mottled dark grey and brown. Typically, it is 1 m long, weighing 4.5 to 5.4 kg, although fish weighing 27 kg have been caught. Lingcod is harvested by bottom trawl, longline, jig and troll gear.

Principal landing season: All year, less plentiful in winter.



SPINY DOGFISH (*Squalus acanthias*)

General: Formerly classified as *Squalus suckeeyi*, this species is now regarded as the same as that found in the Atlantic Ocean. Sometimes called dogfish, spring dogfish, or greyfish, this small shark has typical sharklike features, coloured slate grey or grey-brown above, shading to white below. Dogfish can reach a maximum of 130 cm in length and a weight of 9 kg. It is netted all along Canada's west coast.

Principal landing season: All year.

ENGLISH SOLE (*Parophrys vetulus*)

General: Second in importance only to rock sole among Canada's smaller west coast flatfishes, English sole is often called lemon sole, common sole, or California sole. It is a small Pacific flounder of the family *Pleuronectidae*, and should not be confused with *Microstomus kitt*, the accepted lemon sole in European markets. Most often found in shallow waters, English sole has a narrow, pointed head, and a uniform light brown colouring on the eye side, with a blind side of white or pale yellow. It is caught with bottom trawl.

Principal landing season: All year.

PACIFIC OYSTER (*Crassostrea gigas*)

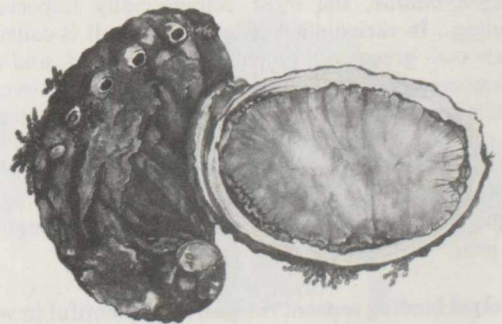
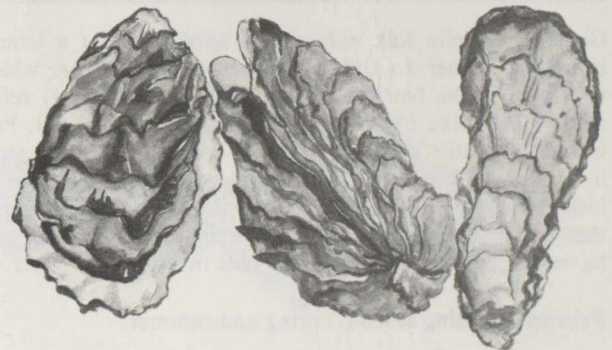
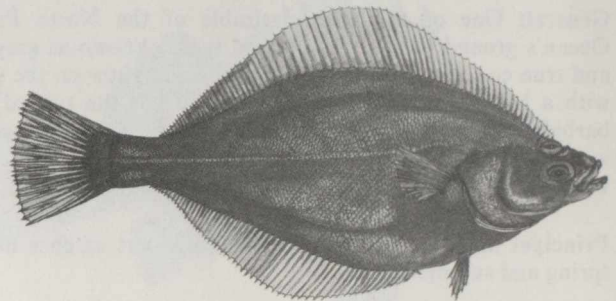
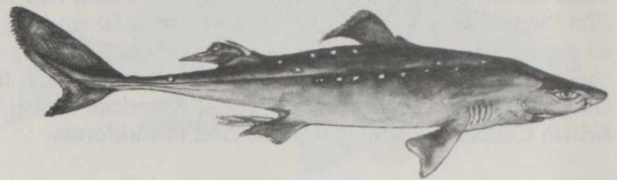
General: Pacific oysters were first imported as juveniles from Japan in the 1920's and planted on oyster beds in the southern part of Canada's west coast. Annual plantings of seed from Japan continued until the mid 1960s. Sporadic general breeding enabled this oyster to spread throughout the Strait of Georgia and in some areas along the southwest part of Vancouver Island. The Pacific oyster can reach up to 30 cm, but usually is harvested at 10 to 12 cm. The shape is irregular depending on the type of bottom on which it grows. The external surface can be highly fluted and is generally grey in colour. Intertidal bottom culture is the most common method used to grow oysters to commercial size, but floating, pin, stake and tray culture also are used. Juveniles planted in the intertidal area can be harvested after three years; in floating culture, after two years.

Principal landing season: October through May, but some landings occur all year.

ABALONE (*Haliotis kamtschatkana*)

General: The abalone is also called pink abalone, pinto abalone, ear-shell, or Venus' ear. Although only its muscular foot is eaten, the abalone is also collected for its unusually shaped and attractively coloured shell. This species prefers exposed or semi-sheltered waters on the outer coast, and the fishery is currently located mainly in the northern part of the province.

Principal landing season: All year.



PRAWNS AND SHRIMPS

Spot prawn (*Pandalus platyceros*)

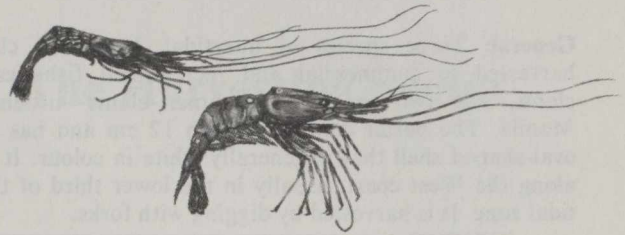
Sidestripe shrimp (*Pandalopsis dispar*)

General: There are 85 species of prawns and shrimps off Canada's west coast, six of which are commercially important. Of these, the spot prawn and the sidestripe shrimp have the highest commercial value.

In some areas, the spot prawn is also called spot shrimp, spot or simply prawn. Its name comes from the distinctive white spots on the first and fifth segments of its body. It is the largest of the local shrimps, sometimes exceeding 25 cm. It ranges from Unalaska to southern California and is harvested with traps on rocky bottoms.

The sidestripe is second only to the prawn in size, reaching 20 cm. The long antennules and striped abdomen clearly distinguish this shrimp from other species. It is found from the Bering Sea to the Oregon coast and is harvested by trawl.

Principal landing season: All year.



GEODUCK CLAM (*Panope abrupta*)

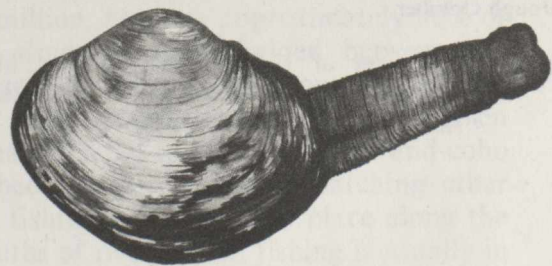
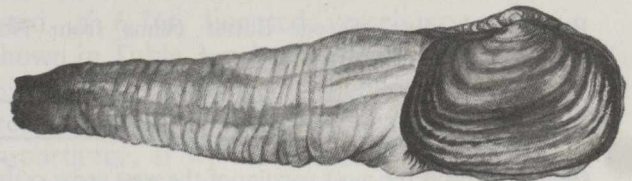
General: This clam is North America's largest intertidal bivalve, and is unusual in that it cannot hold all its soft tissue inside the shell. Pronounced gooey-duck, it is found from southern Alaska to northern Mexico. It can grow to 4.5 kg, although it is usually taken at about 1.4 kg. This species is fished subtidally by divers by means of high-pressure water hoses.

Principal landing season: All year, but in recent years the annual quota has been reached by early fall.

HORSE CLAM (*Tresus capax* and *Tresus nuttalli*)

General: Sometimes called the gaper (because its shell gapes widely at the siphon end) or otter shell, the horse clam is often mistaken for a geoduck. However, it can be distinguished from the geoduck by pads on the siphon tips and tentacles on the inner edge of the siphon. The shell, which grows to 20 cm, is white to grey with brown periostracum that peels off readily. The horse clam occurs along Canada's west coast and is harvested from the intertidal and subtidal zones.

Principal landing season: All year.



INTERTIDAL HARD-SHELL CLAMS

Butter (*Saxidomus giganteus*)

Littleneck (*Protothaca staminea*)

Manila (*Tapes philippinarum*)

General: Three species of intertidal, hard-shell clams are harvested in commercial and recreational fisheries: butter clams, and two species of steamer clams—littleneck and Manila. The butter clam can reach 12 cm and has a heavy, oval-shaped shell that is generally white in colour. It is found along the West coast, usually in the lower third of the intertidal zone. It is harvested by digging with forks.

The littleneck clam is medium-sized, up to 6 cm in length, oval to round in shape and varies from white to brown. It is found along the coast, generally slightly higher on the intertidal beach than the butter clam.

The Manila clam was accidentally imported from Japan with Pacific oyster seed in the early 1930s. It resembles the littleneck clam but is more oblong in shape. Its surface varies in colour from white to yellow to brown, often with geometric patterns. It is found mainly in the southern part of British Columbia at the mid intertidal level and higher. The steamer clam is usually harvested by pulling rakes through the soil and turving out the clams.

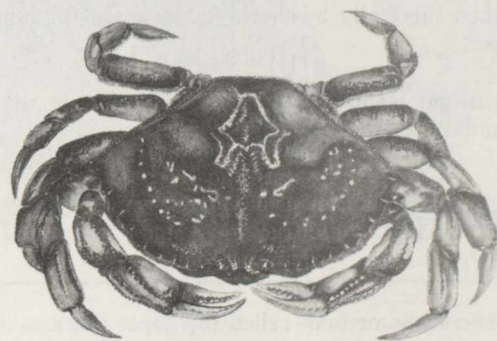
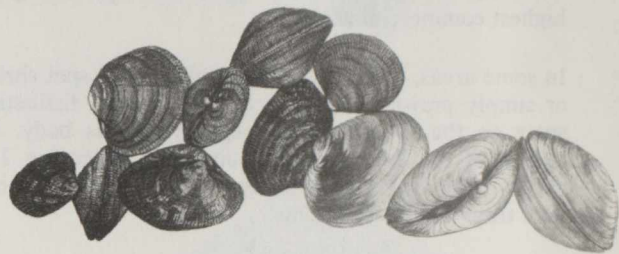
Principal landing season: Butter clams from November through May; steamer clams all year.

DUNGENESS CRAB (*Cancer Magister*)

General: This is the most popular of the west coast crabs. With the typical deep body and large carapace, it weighs between 0.8 and 1.8 kg. Sometimes referred to as market crab, the Dungeness crab is trapped along the entire coast, but is predominantly fished off Graham Island in the Queen Charlotte Islands in Chatham Sound, the Strait of Georgia and Fraser River estuary, and off the west coast of Vancouver Island.

Principal landing season: All year, especially from May through October.

Source: Department of Fisheries and Oceans, Marketing Services Branch, *Canadian Fish Products: Pacific Region*, Supply and Services Canada 1985.



CHAPTER TWO

The Harvesting Sector

THE COMMERCIAL FISHERY

A. Overall Landings

In 1985, the most recent year for which final fisheries statistics are known, a total of 15,567 personal commercial fishing licences were issued by DFO.⁽¹⁾ Excluding packers, the commercial fishing fleet consisted of 6,766 licensed vessels, owned primarily by small, independent operators. As shown in Table 2, salmon is the backbone of the fishing industry, accounting for over 66% of the region's total landed value of \$372 million in 1985. Herring landings, which represented 17% of the total catch value, put that species in second place in terms of importance. If we include fish landed at United States ports, the next species of significance is halibut, but this accounted for only about 4% of the value of total landings. This explains why most of the testimony submitted to the Committee concerned the salmon and herring fisheries.

B. Landings by Fishery

Salmon have supported a commercial fishery in B.C. for more than a century. The commercial fishing fleet, valued at about \$550 million, harvests approximately 90% of all salmon landings, with the balance being almost equally divided between the recreational and native fisheries. Three types of gear are used: gillnets, purse seines and troll gear. Gillnet and purse seine fishermen tend to concentrate their efforts on sockeye, pink and chum salmon, while trollers have tended to target chinook and coho salmon, although they have, in recent years, become more adept at catching other species as well (see Table 3). Gillnet and seine fishing generally take place along the inshore salmon migration routes or near the mouths of rivers. Troll fishing is usually in the offshore areas, although it is sometimes done in the same areas as gillnet and seine fishing.

⁽¹⁾ British Columbia, Ministry of Environment and Parks, Fisheries Branch, Marine Resources Section, *Fisheries Production Statistics of British Columbia 1985*, Queen's Printer for British Columbia, Victoria, September 1986, p. 1.

The commercial salmon fishery is characterized by widely fluctuating harvests. For example, in the very poor fishing year of 1975, only 36,000 tonnes were landed by the commercial fishery, valued at about \$47 million.⁽¹⁾ This variability in turn affects the harvests of the three gear types to widely differing extents, depending on the species mix in a given year. In 1985, salmon landings increased by 117% from about 50,282 tonnes in 1984 to 107,361 tonnes.⁽²⁾ The corresponding landed value increased from

TABLE 2
DISTRICT CATCH BY SPECIES, LANDED WEIGHT (IN TONNES)
AND VALUE, 1985

Species	North ¹ Coast	South Coast	Fraser Area	Total	Landed Value (\$'000)
Chinook	2,168	2,458	212	4,838	25,564
Sockeye	9,198	18,557	3,307	31,062	120,428
Coho	2,766	5,127	77	7,970	26,555
Pink	15,837	19,642	1,068	36,547	38,979
Chum	8,776	14,360	261	23,397	34,755
Steelhead	173	24	3	200	389
Subtotal	38,918	60,168	4,928	104,014	246,670
Salmon Roe	7	2	1	10	26
TOTAL SALMON	38,925	60,170	4,929	104,024	246,696
Herring	18,562	7,205	—	25,767	57,406
Herring Spawn on Kelp	160	28	—	188	5,699
TOTAL HERRING	18,722	7,233	—	25,955	63,105
Halibut ²	3,309	378	—	3,687	10,704
Dogfish	132	2,547	*	2,679	715
Flounder	49	16	1	66	30
Hake ³	—	4,658	1,344	6,002	745
Ling Cod ⁴	966	4,722	*	5,688	3,437
Pacific Cod	1,211	1,133	1	2,345	1,229
Pacific Ocean Pearch	5,525	816	*	6,341	2,971
Pollock	1,154	533	2	1,689	358
Rockfish ⁵	6,516	5,025	13	11,554	6,368
Sablefish ⁴	2,420	1,843	—	4,263	12,082
Skate	293	77	*	370	56
Soles	2,037	742	3	2,782	1,686
Turbot	567	198	—	765	164
Other Groundfish ⁶	425	148	*	573	135
Groundfish Subtotal	21,295	22,458	1,364	45,117	29,976

⁽¹⁾ *Fisheries Production Statistics of British Columbia 1985*, Table 5, p. 10-11.

⁽²⁾ Round weight and not including steelhead trout.

TABLE 2—CONT'D.

Species	North ¹ Coast	South Coast	Fraser Area	Total	Landed Value (\$'000)
Abalone	32	10	—	42	442
Clams ⁷	90	2,842	—	2,932	3,294
Crabs	274	538	353	1,165	4,719
Geoducks	1,366	3,801	—	5,167	4,605
Octopus	9	25	*	34	82
Oysters	—	3,420	—	3,420	2,613
Shrimp and Prawns	133	858	201	1,192	4,559
Scallops	*	37	*	37	95
Sea Cucumbers	—	344	2	346	94
Sea Urchins	—	1,769	47	1,816	764
Other Shellfish ⁸	3	227	3	233	267
Shellfish Subtotal	1,907	13,871	606	16,384	21,534
Eulachons	—	—	29	29	40
Smelt	—	*	1	1	2
Sturgeon	*	1	7	8	16
Tuna ⁹	—	1	—	1	1
Other ¹⁰	—	50	*	50	102
Other Subtotal	*	52	37	89	161
TOTAL	84,158	104,162	6,936	195,256	372,176

¹ Includes landings in the Taku/Stikine district.

² Excludes 1,016 tonnes of halibut valued at \$3,073,560 landed at U.S. ports.

³ Excludes 13,306 tonnes of hake valued at \$2,247,755 delivered to foreign vessels in co-operative fishing arrangements. An additional 10,554 tonnes was caught by foreign vessels in Canadian waters.

⁴ Reported in round weight.

⁵ Includes red, rock and bass, reedi, greenies, other rockfish, red snapper and silver perch.

⁶ Includes non-food fish, idiotfish and shark.

⁷ Includes horse clams.

⁸ Includes mussels, snails, squid and plankton.

⁹ Does not include 56 tonnes worth \$148,403 caught in U.S. waters and landed in Canada by Canadian fishermen.

¹⁰ Includes shad, wolf eels, anchovies and other fish.

* Less than 1 tonne reported.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 3, p. 5-6.

\$144.5 million in 1984 to \$246.3 million in 1985, a record 70% increase largely due to increased landings of sockeye, pink, and to some extent, chum salmon. Sockeye and pink salmon both commanded higher prices in 1985 than in the previous year. Sockeye in particular recorded the largest landed quantity, value and average price in recent history.⁽¹⁾ Preliminary estimates for 1986 reveal a small decline in landings of about 4%,

⁽¹⁾ *Fisheries Production Statistics of British Columbia 1985*, p. 8.

but an increase in landed value by the same amount, due to higher prices.⁽¹⁾ Although 1985 and 1986 were bumper years with landings passing a record 100,000 tonne level, harvests were expected to decline in 1987 and 1988.⁽²⁾

Natives also own or operate about 22% of commercial salmon fishing licences and 28% of herring fishing licences. Proportionately more seine vessels are owned or operated by natives than any other gear type, and approximately 30% of the total commercial salmon harvest is landed by native commercial fishermen. It was estimated that about one-third of the labour in the commercial fishing industry is made up of native citizens.⁽³⁾

Harvested by both purse seine and gillnet, Pacific herring are landed by two distinct fisheries which catch the fish at different stages of physical development. The roe and spawn-on-kelp fishery takes place in the spring, while the lesser valued food and bait fishery is generally during the fall or winter. In terms of landed value, the roe herring fishery, valued at \$63.1 million in 1985, is next to salmon in importance. Although the combined roe and food and bait herring landings experienced a decrease of 23% in landings in 1985 as a result of greatly reduced quotas, the landed value was up by 42% because of higher prices. About 13,000 tonnes of roe herring were harvested in 1986,⁽⁴⁾ the smallest amount since the first quota of 11,000 tonnes was set in 1971.

TABLE 3
SHARE OF SALMON LANDINGS BY SPECIES AND GEAR TYPES, 1985¹
(Round Weight in Tonnes)

SPECIES	Gillnet Tonnes	Share %	Seine Tonnes	Share %	Troll Tonnes	Share %	Total Tonnes
Chinook	525	9.6	733	13.4	4,211	77.0	5,469
Sockeye	13,461	42.6	14,735	46.7	3,373	10.7	31,569
Coho	857	9.6	1,410	15.7	6,710	74.7	8,977
Pink	4,012	10.6	25,996	69.0	7,692	20.4	37,700
Chum	6,211	26.3	15,769	66.7	1,666	7.0	23,646
Steelhead	152	75.2	33	16.3	17	8.5	202
TOTAL	25,218	23.4	58,676	54.6	23,669	22.0	107,563

¹ Includes salmon roe.

Source: Province of British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 6, p. 12.

Groundfish are harvested by longline, trawl, troll and pots. Pacific halibut represented about 4% of the region's total landed value in 1985.⁽⁵⁾ A decade ago, halibut rivalled roe herring in terms of value, but slipped to a distant third by 1979.

⁽¹⁾ Department of Fisheries and Oceans, Economic and Commercial Analysis Directorate, *Canadian Fisheries: Landings*, Vol. 8, No. 12, December 1986, Table 7.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 41.

⁽³⁾ *Ibid.*, Issue No. 9, 24 November 1986, p. 20.

⁽⁴⁾ *Ibid.*, Issue No. 2, 7 November 1986, p. 19.

⁽⁵⁾ Including halibut landed at U.S. ports.

While harvests originating in Canadian waters and delivered to B.C. ports in 1985 increased by 19%, the landed value rose dramatically by over 48%, from \$7.2 million in 1984 to \$10.7 million. About 1,000 tonnes of halibut, valued at \$3.1 million, were also caught in Canadian waters and delivered to ports in the United States. Conservation initiatives taken by the Pacific Halibut Commission, which sets catch quotas, gear regulations and closures, are believed to have resulted in increased landings, particularly since 1982.

Although groundfish, excluding halibut, have never figured prominently on the West Coast, they have increased in importance, given that landed values have almost tripled since Canada extended its fisheries jurisdiction zone in 1977. Excluding Pacific hake delivered to foreign vessels in cooperative fishing arrangements, domestic groundfish landings in 1985 increased by 19%, from about 38,000 tonnes to over 45,000 tonnes, while total landed value increased by 40%, from \$21.4 million to \$30 million. Preliminary figures for 1986 show that the landed value for all groundfish, including halibut, should approach \$52 million.⁽¹⁾

Since invertebrates command relatively high prices in the market, fishermen have demonstrated an increasing interest in fishing these species.⁽²⁾ Landings of over 16,000 tonnes in 1985 represented a 26% increase over 1984, and reflected an overall trend of increased landings for these species, except for abalone. A landed value of \$21.5 million in 1985 represented about 5.7% of the region's total value, with geoducks, oysters and clams making up most of the catch.

THE RECREATIONAL FISHERY

Recreational (or sport) fishing in the region's tidal waters encompasses a wide variety of activities, including digging for clams, trapping crabs, diving for abalone, and angling for many species of fish such as halibut and lingcod. But unlike that on the East Coast, the sport fishery in this region is generally focused on salmon, particularly coho and chinook.⁽³⁾

During its hearings, the Committee heard numerous submissions by sport fishing groups: individual fishermen, recreational fishing organizations, commercial (charter) sport fishing operations, and groups of marina owners involved in the tourist industry. Often emphasized was the fishery's contribution to the region's economy and quality of life, as well as to its growth on the west coast of Vancouver Island, the central and northern coasts of the mainland, and in areas surrounding the Queen Charlotte Islands.⁽⁴⁾ With total licence sales of some 327,000 in 1985, approximately one in every ten adult B.C. residents is a tidal angler. Sport fishing is also believed to be the principal activity of most boaters in B.C.,⁽⁵⁾ and provides an extremely important income base to those who operate commercial resorts and charter operations.

Sport fishermen land about 4% of the total coast-wide catch of salmon. Although this would suggest that these fishermen do not take very many fish, this figure is

⁽¹⁾ *Canadian Fisheries: Landings*, Table 7.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 8.

⁽³⁾ *Ibid.*, p. 9.

⁽⁴⁾ *Ibid.*, Issue No. 9, 24 November 1986, p. 11.

⁽⁵⁾ *Ibid.*, p. 49-50.

somewhat misleading; in the protected inland waters of Georgia Strait, where most of the recreational fishing takes place, this fishery accounts for about 30.7% of the total catch of chinook and coho salmon since the sport fishery is usually allocated most of these preferred species. Coast-wide, sport fishermen are estimated to land about 40% of the chinook and 32% of the coho salmon.⁽¹⁾

THE NATIVE FISHERY

Salmon are also harvested by native people for food or subsistence purposes. In total, there are 192 native bands in B.C., representing 26 tribal councils on some 1,600 reserves. For centuries, the native population of B.C. built elaborate ceremonies, feasts, myths and art around the salmon so that this species has deep cultural and social roots. Historically, the fish have also been an important commodity of trade. About 60% of the native catch is landed in the Fraser River Basin, where about 40% of the province's native population resides,⁽²⁾ with the Skeena and Nass Rivers accounting for about 30%.⁽³⁾ As in the past, the native population depends heavily on fish as a dietary staple; about 4% to 6% of B.C. salmon is landed for native food purposes (mostly in inland areas).

DFO theoretically accords native food fishing first priority in the use of fish, subject only to the overriding needs of resource conservation, which implies leaving spawners to replenish stocks. But since the native fishery is inland, it is usually last in line on the migration gauntlet for salmon, after the commercial and recreational fisheries have taken their catch. Giving priority to the native fishery is therefore difficult, especially since the size of a total salmon stock is not really known until most fishing is completed. Sometimes the native fishery is restricted to one or two days.⁽⁴⁾

AQUACULTURE

During its hearings, the Committee heard a great deal of testimony on the expanding aquaculture industry in B.C. While cultivated fisheries resources are private property and are within provincial jurisdiction, the federal government also has jurisdiction over many aspects of aquaculture. The common property fishery (i.e., the traditional fishery), on the other hand, is exclusively under federal jurisdiction. At present, the aquaculture industry is based primarily on rainbow trout,⁽⁵⁾ Pacific oyster, and chinook and coho salmon.

Current interest in fish and shellfish culturing is surging; the extent of this is seen by the number of investigative permits authorized, as shown in Table 4. The Committee learned that salmon farming in particular had entered a period of rapid and dramatic

⁽¹⁾ Department of Fisheries and Oceans, Economic Analysis and Statistics Division, 15 June 1987.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 9, 24 November 1986, p. 67.

⁽³⁾ N. Schuber, *The Indian Food Fishery of the Fraser River: Catch Summary 1951 to 1982*, Canadian Data Report of Fisheries and Aquatic Sciences, No. 412, October 1983, p. 2, quoted in Sharon O'Brien, "Undercurrents in International Law: A Tale of Two Treaties," *Canada-United States Law Journal*, Vol. 9, No. 1, 1985, p. 13.

⁽⁴⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 19.

⁽⁵⁾ Trout farmers are mainly hobby farmers.

TABLE 4
AQUACULTURE IN BRITISH COLUMBIA, FARM SITES
(OPERATION AND INVESTIGATION), AUGUST 1987

Location	Operate Farm	Investigate Site
<i>North Coast</i>		
Finfish		
Approved	2	27
Applied for	7	53
Shellfish		
Approved	3	0
Applied for	0	0
<i>Mid Coast</i>		
Finfish		
Approved	0	2
Applied for	0	35
Shellfish		
Approved	1	0
Applied for	1	0
<i>Vancouver Island</i>		
Finfish		
Approved	68	125
Applied for	82	132
Shellfish		
Approved	266	3
Applied for	152	6
<i>Lower Mainland</i>		
Finfish		
Approved	53	8
Applied for	44	30
Shellfish		
Approved	91	3
Applied for	36	5

Source: British Columbia, Ministry of Agriculture and Fisheries, "British Columbia Aquaculture Industry: Update", Aquaculture Information Bulletin No. 3-1, undated, Figure 1, p. 7.

growth. In 1979, only three or four salmon farms existed, but by March 1984, this number had expanded to 10. By August 1987, 123 tenures had been issued to operate salmon farms in B.C. That number could more than double within the year, with most of the proposed sites being located on or accessed directly from Vancouver Island.

Salmon farmers specialize in the so-called "growout" phase of rearing salmon: smolts are acquired from a hatchery, raised in net pens anchored in protected inlets and coves and fed prepared diets until they reach marketable size. A significant

development in this industry will be the eventual production of eggs from private broodstock. Prior to 1985, the eggs provided to farmers were usually those in excess of the needs of DFO enhancement hatcheries, but by 1986, there were between 12 and 15 sources of private broodstock.

Salmon farms in B.C. are believed to represent a direct capital investment of some \$100 million. The sudden surge of interest during the 1980s can be attributed largely to successes in Norway, where the salmon farming industry was reported to provide returns of 25% on investment. Activity is currently spurred on by a considerable amount of foreign investment in all sectors, from actual farming to equipment manufacturing. Operating farms were said to provide direct employment for some 375 people and spend about \$50 million on services and supplies annually.⁽¹⁾ A number of witnesses hoped that the advent of such developments in aquaculture would broaden the economic base and growth potential of the province's coastal and island communities.

In 1985, 12 companies reported production totalling 120 tonnes worth \$820,000 (Table 5).⁽²⁾ Production is expected to grow significantly as more farms begin to market their fish. Of the two species of salmon farmed, coho is reputed to be easier to raise, but chinook is expected to command a higher price because it can reach a larger size.⁽³⁾ The B.C. Salmon Farmers' Association, an organization incorporated in 1984 to serve as a producers' association in furthering the interests of the industry, conservatively estimated that production would increase from some 500 tonnes in 1986 to about 40,000 tonnes by 1990.⁽⁴⁾

TABLE 5
BRITISH COLUMBIA SALMON AQUACULTURE PRODUCTION, 1979-1985¹

	COHO		CHINOOK		TOTAL PRODUCTION	
	Quantity (Tonnes)	Value (\$'000)	Quantity (Tonnes)	Value (\$'000)	Quantity (Tonnes)	Value (\$'000)
1979	41	157	—	—	41	157
1980	157	898	—	—	157	898
1981	176	985	—	—	176	985
1982	230	908	43	228	273	1,136
1983	73	350	55	358	128	708
1984	64 ²	306	43	396	107	702
1985	66 ²	395	54	425	120	820

¹ Source: British Columbia Annual Fisheries Production Statistics and British Columbia Commercial Fish Farm Statistics.

² Includes an unspecified amount of marine pen-reared rainbow trout.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 29, p. 32.

⁽¹⁾ B.C. Salmon Farmers' Association, brief submitted to the Committee, 24 November 1986, p. 10.

⁽²⁾ Production decreased in 1983 and 1984 as the result of the implementation of a government broodstock incentive program, where farmers held fish for reproduction.

⁽³⁾ *Production Statistics of British Columbia 1985*, p. 32.

⁽⁴⁾ B.C. Salmon Farmers' Association, brief submitted to the Committee, 24 November 1986, p. 10.

The cultivation of oysters, which is a much less demanding activity than salmon farming, also experienced impressive growth in recent years (Table 6).

TABLE 6
BRITISH COLUMBIA OYSTER AQUACULTURE PRODUCTION, 1974-1985

	Production ¹ (Tonnes)	Landed Value (\$'000)
1974	3,930	880
1975	3,246	883
1976	3,245	887
1977	2,998	981
1978	2,793	1,021
1979	2,231	893
1980	1,922	1,134
1981 ²	1,415	1,030
1982 ²	1,579	981
1983 ²	2,453	1,554
1984 ²	2,897	2,109
1985 ²	3,420	2,613

¹ 1974-1980 production data were provided by the Department of Fisheries Oceans and 1981 — 1985 data were provided by the Shellfish Management Development Unit, Marine Resources Section.

² Includes a small amount of wild oyster harvest from picking permits.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 28, p. 31.

Although current interest in aquaculture centres on salmon, and, to a lesser extent, oysters, short-term impoundment operations are also carried out each spring in the herring spawn-on-kelp industry, and experimental operations are being undertaken by DFO on such species as sablefish, mussels and abalone.

CHAPTER THREE

The Processing Sector and Primary Markets

GENERAL DESCRIPTION

Commercial fishing and processing, the fourth largest primary industry in B.C., and the basic economic activity in many communities outside the industrial triangle of Vancouver, Victoria and Nanaimo, contributed about 1.4% of the provincial gross domestic product in 1985 and nearly 30% of the wholesale value of total Canadian marine fish production.⁽¹⁾ Commercial harvesting and processing in B.C. employs approximately 20,000 people full-time and part-time.⁽²⁾ Because of the multiplier effect, it has been estimated that each direct job in the industry generates another job in the economy, with economic spinoffs extending to people who manufacture cans, plastic bags, cardboard boxes, etc., or who transport fish products to domestic and foreign markets.

The United Fishermen and Allied Workers Union (UFAWU) (7,000 members) and the Native Brotherhood of B.C. (1,200 members) are the bargaining agents for both shoreworkers and fishermen. Minimum prices for net caught salmon and herring are negotiated before each fishing season between these organizations representing the fishermen, and the Fisheries Council of British Columbia (FCBC), representing the processors.⁽³⁾ In other fisheries, prices are determined in response to market conditions. For example, the price of halibut is determined in auction markets such as the one in Prince Rupert, or through direct negotiations between fishermen and buyers. Fishermen in B.C. have also formed cooperatives such as the Prince Rupert Fishermen's Cooperative Association.

In recent years, the industry trend has been away from vertical integration (i.e., processors' ownership of their own fishing fleets). At present, ownership of the fleet is widely dispersed among individual vessel owners, although it can be argued that financing and other arrangements between processors and fishermen can bind a vessel's catch to a company as closely as if the vessel were directly owned.⁽⁴⁾ Although fish

⁽¹⁾ *Fisheries Production Statistics of British Columbia 1985*, p. 1.

⁽²⁾ Auditor General, *Report 1986*, para. 10.18.

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 4, 17 November 1986, p. 12.

⁽⁴⁾ *Ibid.*

processing is characterized by a large number of processing plants scattered along the coast, the activity is geographically centralized in the lower mainland (Table 7).

The Committee learned that in their attempts to revitalize the sector following poor market demand and operating results between 1979 and 1983, fish processors had consolidated facilities, streamlined operations and closed unprofitable plants and canneries, especially along the northern coast. During this difficult period, corporate mergers increased the degree of industrial concentration. Spokesmen for the UFAWU suggested that fish processing in B.C. was in effect "monopolized." For example, one company alone was believed to process about half of all the canned salmon produced.⁽¹⁾ It was estimated that the FCBC, a trade association formed in 1984 to represent the interests of nine processing companies, accounted for over 80% of the total fish processed.

TABLE 7
NUMBER OF BRITISH COLUMBIA FISH PROCESSING FACILITIES BY
GEOGRAPHIC REGION, 1986¹

Region	Canning only	Cold Storage only	Canning and Cold Storage	Plant Only	Total Plants
Lower Mainland	2	47	5	25	79
Southern Vancouver Island	1	28	2	31	62
West Coast Vancouver Island	—	4	—	2	6
Northern Vancouver Island	1	—	—	2	3
Sunshine Coast	—	3	—	6	9
Central Coast	—	1	—	1	2
North Coast/ Prince Rupert	—	5	4	1	10
Queen Charlotte Islands	—	2	—	—	2
Interior of B.C.	—	1	—	—	1
TOTAL	4	91	11	68	174

¹ Does not include vessels that were licensed to process or companies that leased space in licensed facilities. Sport fish canning facilities are included.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1986*, Table 35, p. 46.

THE VALUE OF PRODUCTION BY SPECIES

The major processing methods on the West Coast include canning, freezing, preparation for the fresh fish market, smoking and roe extraction. Canning and freezing are, however, dominant, mainly because salmon, the major species fished, is perishable and harvests are highly seasonal and variable. While fish processing usually averages annual wholesale values of about \$500 million, roughly doubling the landed

⁽¹⁾ *Ibid.*

value of catches, record salmon landings in 1985 resulted in a subsequent wholesale value of \$726 million, an increase of 55%.

Over the years, shifts in the values of salmon by product type (e.g., canned, frozen, smoked) have occurred because of the variability of harvest volumes and species landed. The five species of salmon are close but imperfect substitutes for each other; some are more suitable for canning, such as sockeye and pink salmon, while others are better frozen. Differentiation is also based on the colour and consistency of flesh, which can vary within a species and between species. Salmon production recorded an 85% increase in value in 1985, due mainly to an increase in canned salmon, which accounted for 50% of the total product mix (Table 8). The region's salmon harvest consisted, in ascending order of wholesale value for 1985, of sockeye, pink, chum, coho, and chinook.

TABLE 8
PRODUCTION AND UTILIZATION OF SALMON, 1985

All Salmon ¹	Quantity		Value (\$'000)
	(48-lb. cases)	(Tonnes)	
Canned	1,900,479		258,646
Fresh round	—	101	273
Fresh dressed	—	2,679	13,864
Frozen round	—	—	—
Frozen dressed	—	35,481	204,721
Frozen steaks	—	260	1,926
Salted	—	790	6,625
Smoked	—	747	11,547
Salmon roe ²	—	2,102	12,019
Other specialty products	—	—	385
Other ³	—	—	2,237
TOTAL	—	—	512,243

¹ Includes steelhead trout and values for products such as offal, oil and meal which could not be allocated to particular species. Also included are the value of items where less than three companies are reported.

² Includes roe not broken down by species.

³ Includes offal, offal meal, oil, heads, bait, milts, other products and the value of items where less than three companies reported.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 10, p. 18.

As shown in Table 9, the total wholesale value for herring in 1985 was \$103.1 million. Food and bait production was less significant than roe herring, accounting for only 3% of total value. Food products such as kippered snacks and dry salted, pickled and herring fillets, valued at \$910,000, represented only 1% of the total wholesale value for this species.

TABLE 9
LANDINGS AND PRODUCTS FOR HERRING, 1985

Herring	Quantity (Tonnes)	Value (\$'000)
Landed ¹	25,955	63,105
<u>Processed</u>		
Fresh	60	27
Bait, fresh or frozen	937	2,012
Frozen for food	80	68
Body and offal oil	452	242
Body and offal meal	4,551	2,124
Roe ²	3,599	91,792
Spawn-on-kelp	188	5,699
Other ³	—	1,168
TOTAL WHOLESALE VALUE	—	103,132

¹ Includes herring spawn-on-kelp

² Includes mature and immature roe

³ Includes kippered snacks, pickled, dry salted, carcasses for export, fillets and other herring products.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 30, p. 35.

TABLE 10
LANDINGS AND PRODUCTS FOR HALIBUT, 1985

Halibut	Quantity (Tonnes)	Value (\$'000)
Landed (B.C. Ports)	3,687	10,704
<u>Processed</u>		
Fresh dressed	1,652	5,958
Frozen dressed	2,026	9,003
Fillets, frozen	92	607
Steaks, frozen	12	107
Other ¹	—	48
TOTAL WHOLESALE VALUE	—	15,723

¹ Includes fresh fillets, blocks and other halibut products.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 30, p. 34.

Halibut production in 1985, valued at \$15.7 million (Table 10), increased by 26%. Although 57% of this total was frozen dressed halibut, fresh dressed halibut increased its share of production from 29% in 1984 to 38% in 1985. As shown in Table 11, production for other species of groundfish such as rockfish, sablefish and dogfish has risen considerably in recent years. Very little groundfish is canned.

TABLE 11
COMPARATIVE WHOLESALE VALUES OF MAJOR GROUND FISH SPECIES
OTHER THAN HALIBUT, 1983-1985

Species	1983 (\$'000)	1984 (\$'000)	1985 (\$'000)
Sole	4,093	4,913	5,189
Rockfish ¹	11,828	14,663	18,501
Pacific Cod	7,452	7,038	3,590
Ling Cod	3,814	3,931	8,853
Sablefish	7,447	8,829	14,889
Flounder	58	74	73
Skate	163	120	131
Pollock	2,372	1,485	2,023
Turbot	1,124	1,246	1,526
Hake ²	400	649	837
Dogfish	836	858	1,809
Other groundfish ³	2,572	3,247	3,311
TOTAL	42,159	47,053	60,732

¹ Includes Pacific ocean perch, red snapper and other rockfish.

² Excludes over-the-side sales to foreign vessels in co-operative fishing arrangements.

³ Includes other groundfish, portions, sticks and specialties, and groundfish meal, oil and solubles.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 25, p. 28.

Wholesale values for invertebrates totalled \$27.9 million in 1985, and according to value, comprised clams (including geoducks) 34%; crabs, 21%; shrimp and prawns, 19%; oysters, 11%; and sea urchins, 11% (Table 12). Abalone, clams, geoducks, mussels and prawns were the only products to decrease in terms of value between 1984 and 1985. All other species accounted for the remaining 4%.

TABLE 12
COMPARATIVE WHOLESALE VALUES OF MAJOR SHELLFISH SPECIES,
1983-1985

Species	1983 (\$'000)	1984 (\$'000)	1985 (\$'000)
Abalone	590	560	480
Clams ¹	2,686	5,010	4,859
Geoducks	4,202	5,175	4,743
Crabs	3,941	5,639	5,942
Octopus	97	110	121
Oysters	1,599	2,483	2,966
Shrimp	1,308	2,173	2,555
Prawns	2,270	2,886	2,880
Squid	13	25	120
Mussels	4	3	—
Scallops	23	114	128
Sea Urchins	935	1,774	2,934
Other	183 ²	33 ³	151 ³
TOTAL	17,851	25,985	27,879

¹ Includes horse clams.

² Other shellfish.

³ Includes sea cucumbers and other shellfish.

Source: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 27, p. 30.

PRIMARY MARKETS FOR PACIFIC COAST FISHERY PRODUCTS

Table 13 summarizes wholesale values and provides a breakdown of exports by fish species. In short, the West Coast fishing industry is very dependent on exports, the total value of which was approximately 55% of the total wholesale value of production in 1985. Generally speaking, these exports go to countries which make up only 12.8% of the world's population, but which consume 32.5% of the world's total supply of available food fish.

A. Markets for Salmon

Salmon products are relatively expensive in comparison with product equivalents or substitutes; world demand is therefore concentrated in countries with relatively high per capita incomes. As shown in Figure 2, the major markets for B.C.'s canned salmon have been the domestic market, accounting for about 50% of all canned salmon sales by weight, followed by the United Kingdom, continental Europe, Australia and New Zealand. While half of all canned salmon was consumed in Canada, about 85% of the frozen salmon produced was exported to such countries as France, Japan, the United

States and Sweden. About 20% of total frozen salmon production was exported to EEC countries, excluding France.

Markets for fresh salmon, a very small proportion of total salmon production on the West Coast, are mainly the domestic market (about 40% of total production in 1985) and the United States market (about 50% of total exports). About one-third of the smoked salmon produced is exported to such countries as the United States (41% of exports in 1985), Japan (31%) and Australia (27%). Most salmon roe products are exported to Japan.

TABLE 13
PRODUCTION AND FISH PRODUCT EXPORTS BY SPECIES, 1985

Species	Total Production Value (\$'000)	Fish Product Weight (Tonnes)	Exports Value (\$'000)
Salmon ¹	512,243	43,795 ²	267,677
Herring	103,132	4,873	85,389
Groundfish ³	76,457	17,943	31,549
Invertebrates ⁴	27,879	2,318	11,576
Other	470	256	195
TOTAL³	720,181	69,185	396,386

¹ May include some Atlantic salmon production.

² 611,092 48-lb. cases.

³ Excludes halibut landed by B.C. fishermen at United States ports and hake delivered to foreign vessels in cooperative fishing arrangements. Includes dogfish.

⁴ Includes sea cucumbers.

Sources: British Columbia, *Fisheries Production Statistics of British Columbia 1985*, Table 1, p. 2; *1985 Fish Product Exports of British Columbia*, p. 1.

B. Markets for Other Products

Markets for other fish species are generally narrower. Herring roe is destined almost exclusively for the lucrative Japanese market, where it is further processed and marketed as kazunoko, a gourmet item associated with religious festivals or celebrations. The less valued food and bait herring products largely supply local demand.

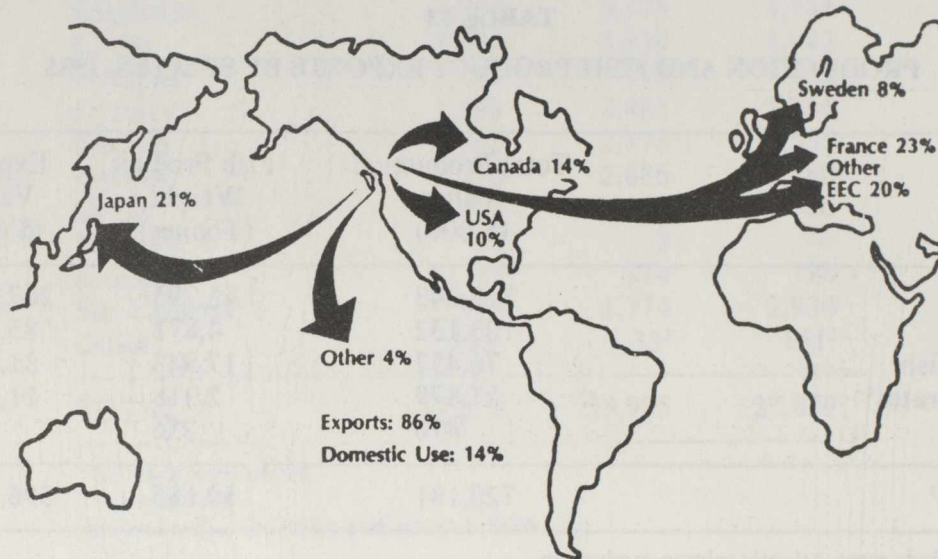
In comparison with the products of the Canadian Atlantic fishery, which are sold world-wide, the region's small groundfish production goes mainly to the local domestic market and the adjacent Western United States. Some direct sales have also been made to foreign factory ships operating within the 200-mile limit; in the past these have involved low valued and perishable species. In 1985, 13,306 tonnes of hake valued at \$2.2 million were purchased over-the-side by Poland from Canadian fishermen.⁽¹⁾

⁽¹⁾ *Fisheries Production Statistics of British Columbia 1985*, Table 26, p. 29.

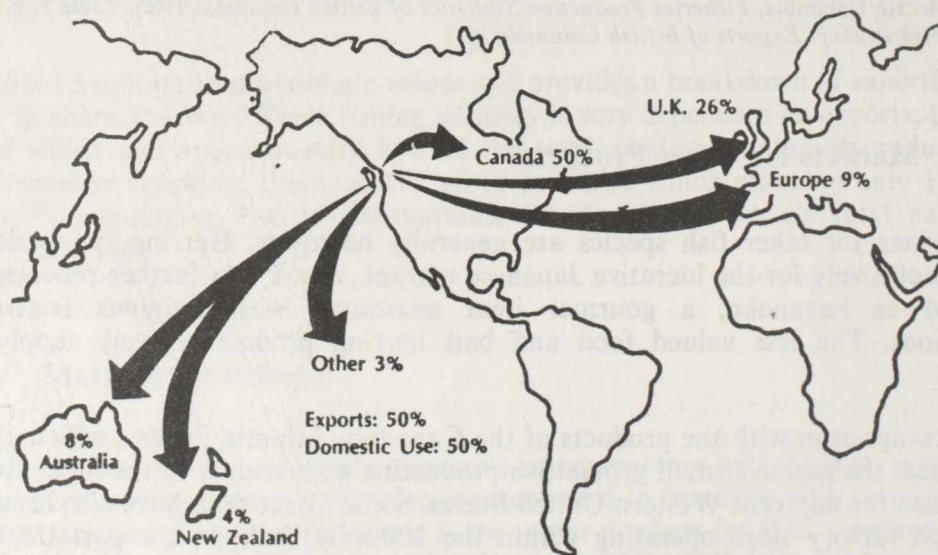
Japan is the major market for abalone and geoducks. Most B.C. oysters are sold in local markets in the fresh form. It is difficult to generalize about the markets for the region's remaining products.

FIGURE 2 — DESTINATION OF B.C. FROZEN AND CANNED SALMON (1980-1984 AVERAGE SALES BY WEIGHT)

Sales of frozen salmon



Sales of canned salmon



Source: FCBC, *Trends in the Commercial Fishing Industry of British Columbia*, Vancouver, March 1986, p. 9.

CHAPTER FOUR

Marketing Trends and Challenges

BACKGROUND

Only a decade or two ago, fish had a dull image. It was something to eat grudgingly on Friday or when the budget was too strapped for a sirloin. Various factors, however, have conspired to lift it from a food associated with penance to an everyday staple, and even a gourmet treat.

(*New York Times*, 1 March 1987, section 3, p. 1.)

Changing consumer tastes and preferences have spurred the demand for seafood. As well, the concern for a more healthful diet has prompted consumers to reduce their intake of red meats and turn to substitute protein foods, notably fish, that are low in calories and fat. This trend is particularly evident in industrialized countries, which also happen to be the principal markets for West Coast fishery products. Development of more efficient transportation and handling systems has significantly increased the penetration of inland markets. All these factors have pushed the demand for seafood well beyond the level that existing supply can meet. In the United States, for instance, per capita seafood consumption increased from 10.9 pounds (4.9 kilograms) in edible weight in 1966, to 14.5 pounds (6.6 kilograms) in 1985,⁽¹⁾ and it is projected to approach 30 pounds (13.6 kilograms) by the year 2000. In comparison, annual poultry consumption is at 72.7 pounds (33 kilograms) per capita, and beef, which used to be in the 80-pound range, is now at 75.8 pounds (34.4 kilograms). Even the most optimistic scenario, however, would not show per capita seafood consumption as close to that of poultry or beef.

One witness told the Committee that the disastrous fluctuations in demand-supply balance that have ailed the fishing industry in the past are probably over, and demand will likely continue to outstrip supply from now on.⁽²⁾

⁽¹⁾ United States, Department of Commerce, *Fisheries of the United States, 1985*, Current Fisheries Statistics No. 8380, April 1986, p. 79.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 10, 2 December 1986, p. 19.

Canada's major markets, namely the United States, Japan and Western Europe, are now and in the foreseeable future characterized by supply shortages, strong consumer demand and relatively high prices. Since these markets are far more profitable than those in the rest of the world, the inevitable consequence, the entrance of seafood supplies from non-traditional sources, has already begun.

SUPPLY-DEMAND TRENDS

A. The World Supply Picture

The total world fish catch, which grew at a rate of 5% annually during the 1950s and 1960s, has sharply declined to around 1% growth per annum. At this rate, world fish production will have increased from 75 million tonnes in 1982⁽¹⁾ to 90 million tonnes by the year 2000. On the other hand, world demand for food fish could reach 93 million tonnes by that year. In 1982, 73% or 55 of the 75 million tonnes world fish catch were used for human food. At the same usage, 127 million tonnes of fish catch will be needed to satisfy the demand for 93 million tonnes food fish in 2000.

Whether there will be sufficient resources to meet this future demand is highly doubtful. The rate of increase in the world fish catch has dropped sharply because known stocks of fish have either been fully exploited or are being excessively harvested. The 1977 extension of the coastal nations' fisheries jurisdictions to 200 miles now has worldwide approval. Over 100 coastal states have assumed control of 99% of the total marine fishery resources of the world, in marked contrast to just a decade ago, when a handful of powerful maritime countries dominated the world fishing industry. The conservation and development of the oceans' fish resources have now become the responsibility, jointly to some extent, but separately for the most part, of these coastal countries. Along with this responsibility came greater opportunities for these coastal states, both developed and developing, to reap the full benefit of the marine resources off their shores. In this regard, Canada has played a lead role in instituting sound resource management practices which have earned the respect of other maritime countries.

B. Coping with the Growing Demand for Seafood

Accessing or creating supply will pose the greatest challenge for the world's fish producers in meeting the expanding demand for seafood in the next decade and beyond. The equation appears simple but the permutations are highly complex, considering the diverse markets, each with its inherent consumer preferences.

There must be dramatic improvements in the exploitation of existing fishery resources, particularly by producers who have so far concentrated on western industrialized markets and to some extent Japan. Present methods of producing traditional product forms from raw fish for these markets result in tremendous waste which, if allowed to continue, will make it even more difficult for supply to meet demand.

Significant strides in proper handling and fast and efficient modes of transporting seafoods have made possible the rapid introduction of new, exotic fish species into the

⁽¹⁾ Food and Agriculture Organization (FAO) of the United Nations, 1984.

market place. The outstanding market successes of hitherto unknown species, such as orange roughy and hoki from New Zealand, clearly indicate that there is much room for non-traditional species of Canadian fish in existing markets.

As the demand for seafood continues to exceed supply, there will be a need for new product forms. Intensified consumer interest in seafood, both its nutrition and its taste, should spur product research and development.

The next decade should bring substantial inflows of seafood supplies from marine and freshwater aquaculture operations. Aquaculturists are being challenged to develop a markedly expanded list of finfish and shellfish species in order to narrow the gap between supply and demand.

TABLE 14
FISH CONSUMPTION IN PRIMARY MARKETS, 1980-1982

Market	Population (millions)	Estimated Liveweight Equivalent			% of Total Fish Supply
		Average per capita consumption		Tonnage of Fish Required (000s tonnes)	
		Kilograms	Pounds		
<i>North America</i>					8.0
Canada	24.9	21.4	47.2 ¹	533	
U.S.	234.2	16.6	36.6 ²	3,888	
<i>Europe</i>					5.6
West Germany	61.4	8.4	18.5	516	
France	54.4	24.3	53.6	1,322	
Sweden	8.3	32.3	71.2	268	
U.K.	56.3	17.5	38.6	985	
<i>Australasia</i>					19.0
Japan	119.3	86.0	189.6	10,234	
Australia	15.0	14.9	32.8	224	
New Zealand	3.2	9.6	21.2	31	
MARKETS FIGURES:	577	31.2	68.7	18,001	32.5
WORLD FIGURES:	4,500	12.3	27.1	55,350	100.0

¹ Equivalent to 13.8 pounds edible meat.

² Equivalent to 12.7 pounds edible meat.

Note: Edible meat equivalence not available for other countries.

Source: United States, Department of Commerce, *Fisheries of the United States, 1985*, Current Fisheries Statistics No. 8380, April 1986, p. 81, 82.

C. Trends in Primary Markets

Table 14 shows that the West Coast's primary export markets registered an average per capita fish consumption in 1980-1982 of 31.2 kilograms or 68.7 pounds, live weight equivalent, compared to the world average of 12.3 kilograms or 27.1 pounds.

1. North America

Interestingly, North America has emerged not only as the most lucrative market for seafood but also as the greatest marketing challenge to the world's seafood producers. It must be noted that around three kilograms of fish are needed to deliver one kilogram of edible seafood meat to the American consumer. Clearly, this is one of the main reasons for the high prices of seafood in the United States.

TABLE 15

**ANNUAL PER CAPITA CONSUMPTION OF FISH AND SHELLFISH
IN THE UNITED STATES, 1982-1985**

Year	Population (Millions)	Fresh/Frozen (Pounds)	Canned (Pounds)	Cured (Pounds)	Total (Pounds)
1982	229.9	7.7	4.3	.3	12.3
1983	232.0	8.0	4.8	.3	13.1
1984	234.8	8.5	4.9	.3	13.7
1985	237.0	9.0	5.2	.3	14.5

Note: Consumption figures refer only to fish and shellfish entering commercial channels, and do not include consumption of recreationally caught fish and shellfish, which since 1970 is estimated at 3 to 4 lbs. (edible meat) per person annually. The figures are calculated on the basis of raw edible meat, i.e., excluding bones, viscera, shells, etc.

Source: United States, Department of Commerce, *Fisheries of the United States, 1985*, Current Fishery Statistics No. 8380, April 1986, p. 79.

TABLE 16

**VALUE OF UNITED STATES FISH IMPORTS AND EXPORTS, 1977 AND 1986
(\$ Millions U.S.)**

Products	Imports		Exports		Trade Deficit	
	1977	1986	1977	1986	1977	1986
Edible	2,078	4,813	473	1,290	1,605	3,523
Non-edible	555	2,813	47	66	508	2,747
TOTAL¹	2,634	7,626	520	1,356	2,113	6,270

¹ Totals are rounded numbers.

Source: United States, Department of Commerce, *Fisheries of the United States, 1986*, Current Fisheries Statistics No. 8385, April 1987, p. 53, 64.

After Japan, the United States ranks as the second largest fish importer in the world. In 1986, the Americans imported approximately 80% of their domestic fish requirements; this significantly increased their fishery products trade deficit, inclusive of non-edible fish products, from about \$2.1 billion in 1977 to \$6.3 billion (Table 16).

While Canada has improved its position as the leading single country seafood supplier of the United States, South America and Asia have registered higher growth in their shares of this huge market.

Canada's share of the United States market tonnage of edible fishery products grew by 9.5%, from 22.0% in 1977 to 24.1% in 1986, while South American suppliers almost doubled their share from 7.0% in 1977 to 13.3% in 1986 (Table 17). Asia's share grew from 29.9% to 33.8% over the same period. The Canadian market share growth resulted primarily from the decline in European groundfish supplies.

TABLE 17

**UNITED STATES IMPORTS OF EDIBLE FISHERY PRODUCTS BY REGION,
1977 AND 1986**

Region	1977		1986	
	Tonnes ('000s)	Percentage Distribution	Tonnes ('000s)	Percentage Distribution
Canada	217.1	22.0	325.2	24.1
Central America	125.8	12.7	114.2	8.4
South America	69.4	7.0	179.6	13.3
EEC	75.6	7.7	102.4	7.6
Other Europe	142.6	14.4	109.4	8.1
Asia	295.4	29.9	456.7	33.8
Australia & Oceania	36.2	3.7	28.3	2.1
Africa	25.3	2.6	35.8	2.6
TOTAL	987.4	100.0	1,351.6	100.0

Based on information contained in United States, Department of Commerce, *Fisheries of the United States, 1986*, Current Fisheries Statistics No. 8385, April 1987, p. 55; and United States, Department of Commerce, *Fisheries of the United States, 1977*, Current Fisheries Statistics No. 7500, April 1978, p. 40.

As Americans have become more conscious about health, nutrition and fitness, their per capita consumption of red meats has declined in favour of chicken, and to some extent, fish (Table 18).

The phenomenal expansion of poultry consumption can be largely attributed to the profitability of chicken production. On the other hand, the cost of producing fishery products will likely continue to escalate with the increasing shortage in supply.

According to market data derived from the Fisheries Council of Canada, per capita fish consumption in Canada has not been nearly as impressive as in the United States. Table 19 shows that Canadian per capita consumption of seafood increased

TABLE 18

UNITED STATES MEAT AND FISH CONSUMPTION ESTIMATES, 1985-1986

Food	1985		1986		Percentage Change
	(Kilograms)	(Pounds)	(Kilograms)	(Pounds)	
Beef	35.9	79.1	34.4	75.8	-4.2
Pork	28.2	62.2	27.0	59.5	-4.3
Poultry	31.5	69.4	33.0	72.7	+4.8
Fish	6.6	14.5	6.7	14.8	+1.5

Source: Department of Fisheries and Oceans, Economic and Commercial Analysis Directorate, 1987.

TABLE 19

CANADIAN ANNUAL PER CAPITA CONSUMPTION OF FISH AND SHELLFISH, 1982-1985

Year	Fresh/Frozen		Canned		Cured		Total	
	(kg)	(lb.)	(kg)	(lb.)	(kg)	(lb.)	(kg)	(lb.)
1982	4.23	9.32	1.78	3.92	0.24	0.53	6.25	13.77
1983	4.27	9.41	2.05	4.52	0.11	0.24	6.43	14.17
1984	4.28	9.43	2.05	4.52	0.17	0.37	6.50	14.32
1985	4.36	9.61	2.24	4.94	0.05	0.12	6.66	14.67

Source: Fisheries Council of Canada, brief submitted to the Committee, 4 November 1986, p. 5.

from 13.77 pounds (6.25 kilograms) in 1982 to 14.67 pounds (6.65 kilograms) in 1985. At this rate of growth, it is conceivable that Americans now eat more fish and shellfish than their neighbours to the north.

Although Canada has maintained its position as the world's largest fish exporter, in-country consumption of fishery products shows only a slight uptrend. Witnesses from the trade sector told the Committee that unfamiliarity with seafood appears to be a key reason why Canadians are not eating more fish.

Recent statistics compiled by DFO indicate that imports of fishery products into Canada grew from \$495.8 million in 1985 to \$616.5 million in 1986, an increase of 24.3% in value (Table 20). In terms of quantity, the growth in imports was still a hefty 12.2%, from 135,789 tonnes in 1985 to 152,371 tonnes in 1986 (Table 21). On a per capita basis, each Canadian consumed 13.43 pounds (6.09 kilograms) of imported fishery products in 1986 compared to 11.97 pounds (5.43 kilograms) in 1985. Put in another way, 81.6% of fish consumed by Canadians in 1985 was imported, and this percentage will be even greater in 1986. A closer examination, moreover, reveals that 60% of the imports came from the United States, a figure which should be of concern to the Canadian fishing industry since some of these imports are undoubtedly of Canadian origin.

The move towards value-addition has apparently caught fire, particularly in the North American seafood market. Suppliers of conventional product forms have joined the bandwagon by adding prepared items in answer to expanding demand for exotic seafoods in forms which are easy to cook and serve. At the 1987 Boston Seafood Show, the Committee saw an impressive array of fish and shellfish product innovations, many of which were indeed appealing to the palate. Obviously, seafood marketers are profiting from the broadening taste of consumers, as shown by the increased interest in non-traditional species. The West Coast has an abundance of opportunities to develop

TABLE 20
QUANTITY AND VALUE OF CANADIAN IMPORTS BY PRODUCT TYPES,
1984-1986

Product	1984		1985		1986	
	Quantity (Tonnes)	Value (\$000)	Quantity (Tonnes)	Value (\$000)	Quantity (Tonnes)	Value (\$000)
Fresh/Frozen						
Seafish	43,472	99,371	51,733	122,076	56,206	154,933
Shellfish	27,777	216,844	26,957	218,556	29,678	269,807
Freshwater fish	2,588	8,992	2,487	8,374	3,130	10,695
Steaks and blocks	5,346	14,180	5,369	14,351	6,250	21,334
TOTAL	79,183	339,387	86,546	363,357	95,264	456,769
Smoked	338	1,442	382	1,855	450	2,546
Salted or dried	1,301	4,815	1,518	5,614	1,278	5,212
Cured or pickled	312	651	410	681	410	620
Canned						
seafish	18,091	80,792	16,308	71,663	21,188	91,978
shellfish	9,656	53,610	8,868	42,114	9,167	42,640
Meal	5,570	1,745	742	193	2,994	1,323
Oil	273	563	359	620	468	881
Other seafish products	5,023	6,776	5,802	8,227	6,129	12,967
Other shellfish products	15,106	1,348	14,855	1,509	15,023	1,539
TOTAL¹	134,853	491,129	135,789	495,832	152,371	616,475

¹ Quantities exclude canned anchovy and canned sardine, which are reported in number of boxes.

Sources: Department of Fisheries and Oceans, Economic Analysis and Statistics Division, *Canadian Fisheries — Statistical Highlights, 1985*, p. 24, 25; Department of Fisheries and Oceans, Economic Analysis and Statistics Division, *Canadian Fisheries — International Trade*, December 1986, Vol. 8, No. 12, Part Two — Imports, May 1987, p. 1-3.

TABLE 21

QUANTITY AND VALUE OF CANADIAN IMPORTS BY SOURCE, 1984-1986

Source	1984			1985			1986					
	Quantity (Tonnes)	%	Value (\$000)	%	Quantity (Tonnes)	%	Value (\$000)	%	Quantity (Tonnes)	%	Value (\$000)	%
U.S.	81,062	60	271,583	56	80,569	59	266,416	54	91,986	60	311,620	51
EEC	7,320	5	20,411	4	10,419	8	39,606	8	13,907	9	50,559	8
Other European countries	9,092	7	24,430	5	4,721	3	10,462	2	3,100	2	9,474	2
Central and South America	6,505	5	40,893	8	9,730	7	47,927	10	4,507	3	43,350	7
Japan	11,319	8	36,257	7	9,452	7	36,401	7	8,276	5	45,156	7
All other countries	19,555	15	97,555	20	20,898	15	95,020	19	30,595	20	156,315	25
TOTAL ¹	134,853		491,129		135,789		495,832		152,371		616,475	

¹ Quantities exclude canned anchovy and canned sardine, which are reported in number of boxes. Percentages may not add to one hundred, due to rounding.

Sources: Department of Fisheries and Oceans, Economic Analysis and Statistics Division, *Canadian Fisheries — Statistical Highlights, 1985*, p. 25; Department of Fisheries and Oceans, Economic Analysis and Statistics Division, *Canadian Fisheries - International Trade*, December 1986, Vol. 8, No. 12, Part Two — Imports, May 1987, p. 4.

not only new product forms from existing commercialized species, but, equally important, from unharvested or under-harvested species of fish and shellfish.

In Canada, consumption of fresh/frozen salmon was estimated at 14,000 tonnes in 1985, about 16% of the total consumed in North America. Ontario and Quebec accounted for over 60% of the Canadian consumption. The Canadian consumption pattern, with a higher proportion of sales to restaurants and more sales to grocery departments than to specialty fish stores, varies considerably from the overall North American trend.

One witness, the proprietor of a small chain of retail fish stores in Ottawa, stated that equipment manufacturers have very recently started to produce store counters especially for fish, rather than merely converting meat counters. These new fish counters are designed to hold fresh fish on ice instead of using refrigeration, which tends to dry the product.⁽¹⁾

The giant supermarket chains have started to develop major fish marketing schemes. One of these large chains, with headquarters in Montreal, now has 55 stores with "boutique-style" fish counters. Sales from these "fish shops" have been growing at a healthy rate and now represent 10 to 12% of deli departments' turnover.⁽²⁾

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 10, 2 December 1986, p. 14.

⁽²⁾ *Ibid.*, Issue No. 13, 27 January 1987, p. 6.

But amid these positive developments, looms the serious problem of inadequate and inconsistent supply. Several witnesses expressed fears that the exorbitant increases in prices of fresh fish caused by strong market demand, especially in the United States, may very well lead to declines in consumer interest. As well, Canadian fish producers find it more lucrative to sell to large buyers in the United States, leaving Canadian fish retailers and wholesalers to obtain their supplies from American seafood brokers.

Fresh/frozen salmon requirements in the United States were estimated at 73,000 tonnes in 1985, with approximately a third made up of fresh salmon. By 1990, this market segment is forecast to reach 110,000 tonnes. A recent survey commissioned by the B.C. Salmon Farmers Association indicated that in the United States, 60% consumption of fresh salmon is through restaurants and 40% through retail outlets. Table 22 shows the existing and potential market demand pattern for fresh/frozen salmon in North America. The study indicated that the grocery/supermarket segment within the retail sector is expected to have the fastest growth.

TABLE 22

FRESH/FROZEN SALMON: NORTH AMERICAN DEMAND BY MARKET SEGMENT

Market Segment	Existing Shares	Growth Potential	Potential Shares
<i>Food Service</i>			
Restaurants	60%	42%	55%
<i>Retail</i>			
Grocery/ Supermarkets	20%	109%	27%
Specialty fish stores	20%	45%	18%
TOTAL	100%	57%	100%

Source: The DPA Group Inc. and Dr. J. Anderson and Michael D. Hurst, *Market Access and Penetration Strategy, B.C. Farmed Salmon: Executive Summary of First Report*, Exhibit 2, February 1987, p. 6.

2. Europe

In recent years, the European Economic Community has been a declining market for Canadian fishery products. The unfavourable currency exchange rendered Canadian fishery exports uncompetitive with those of closer countries like Norway, Iceland and Scotland. In the United Kingdom, for instance, Canadian canned sockeye salmon prices increased by 20% in 1985 over 1984 as a result of the depreciation of the pound sterling. Protectionism in the form of tariffs on imported fishery products has also deterred the growth of Canadian fish exports to the EEC.

3. Australasia

Consisting of Japan, Australia and New Zealand, this market segment consumes around a fifth of the total world supply of food fish. The Japanese, who account for almost 97% of this group's fish consumption, are of course the world's largest seafood consumers. Not only are their quality expectations very high, but the Japanese have established a unique and effective purchasing system for marine products. Although they are highly dependent on seafood as a source of protein, Japanese consumers have reacted quickly to changes, either induced or natural; in the supply pattern. While there appears to be a trend away from the traditionally high consumption of fish, particularly among the younger generation, the overall preference is still overwhelmingly in favour of fish over meat, in the ratio 7:3. (The ratio is 8:2 in favour of meat over fish in the industrialized West.)

Since 1977, when coastal states extended their fishery zones to 200 miles, Japan's fish landings gradually diminished. As fish consumption did not decrease correspondingly, major Japanese fishing companies turned to trading to make up for the ensuing shortfall.

In the longer term, Japanese annual per capita fish consumption is projected to increase from 189.6 pounds (86.0 kilograms) to 240 pounds (109.2 kilograms) by the year 2000. The supply of marine products will, therefore, have to increase from the current 12 million tonnes to 14 million tonnes. This additional supply will have to come from more imports, expansion of aquaculture, more joint ventures with other coastal countries, and introduction of new species.

The Australian and New Zealand markets will remain small but challenging to maintain. These two countries will also become more important as fish exporters, in view of increased commercialization of their fishery resources.

COMPETITION

A. Salmon Producers

The West Coast industry, which sells most of its salmon to export markets in canned and frozen form, is generally not the dominant supplier; it must compete with the harvests of other salmon producing countries.

As shown in Table 23, Canada ranks fourth among the world's five largest salmon-producing countries (with nearly all of its production from B.C.), behind the United States, Japan and the Soviet Union. West Coast producers are not generally regarded, therefore, as being a force in setting world market prices. The products of two major world producers, Japan and the Soviet Union, generally do not compete directly with those of B.C. since they are typically sold to their respective domestic markets; even so, in the future Canadian producers will have to respond to a projected increase in total world production, resulting mainly from developments in aquaculture, or more specifically salmon farming.

As seen in Table 24, which gives the annual production of farmed salmon by the world's largest producers, since 1983 the total supply of farmed salmon has increased

TABLE 23

ANNUAL SALMON PRODUCTION BY THE WORLD'S FIVE LARGEST PRODUCERS,
1981-1985

Country	(Tonnes)				
	1981	1982	1983	1984	1985
Canada	78,840	65,600	74,602	50,282	107,000 ^c
U.S.	294,112	275,515	289,985	312,166	318,334
Japan	156,112	142,799	166,781	135,000 ^c	150,000 ^c
Norway	8,716	10,984	17,604	25,000 ^c	30,000 ^c
Soviet Union	101,500	61,100	125,000	80,000 ^c	125,000 ^c
TOTAL	639,280	555,998	673,972	602,448 ^c	730,334 ^c

^c FCBC estimates.

Source: FCBC, *Trends in the Commercial Fishing Industry of British Columbia*, Vancouver, March 1986, p. 6.

dramatically, by over 230%. A projected trend for increased production in a number of other countries, as well as on the East Coast of Canada, brings marketing very much to the fore.

1. The United States

The United States, the world's major producer of wild salmon, landed well over 300,000 tonnes, valued at \$439.8 million (US) in 1985, with the state of Alaska alone accounting for 90% of this total. A sizeable increase in the total world supply of salmon since the late 1970s can in fact be attributed to increases in Alaska's production: from approximately 44 million pieces of fish in 1976 to nearly 147 million pieces in 1985.⁽¹⁾ Cited as the major reason for this phenomenon was the supplemented production from state hatcheries and private non-profit hatcheries practising salmon "ranching," a technique which promotes the anadromous return of adult salmon, like that of wild stocks, after hatchery releases of fry. According to some witnesses, Alaskan processors are formidable competitors that occupy large shares of the European and Japanese frozen salmon and canned salmon markets because of the cost advantages of their large volumes of harvest.

Although accurate data on American production of farmed salmon are not available,⁽²⁾ the state of Washington, which produced 1,257 tonnes in 1985, is believed to account for more than half of the United States total. It should be mentioned that fish farming may soon be allowed in the state of Alaska.⁽³⁾ As the state has more coastline than the rest of the continental United States, Alaska's potential as a producer of farmed salmon is truly astonishing.

⁽¹⁾ Alaska Department of Fish and Game, "Commercial Fisheries Stock Status: An Overview" and "1986 Preliminary Alaska Commercial Fisheries Harvests and Values," information pamphlet submitted 9 February 1987.

⁽²⁾ British Columbia, Ministry of Agriculture and Fisheries, *The Market for Farmed Salmon: An Overview*, 1986, p. 5.

⁽³⁾ "At Last, Alaska May Back Aquaculture," *Seafood Leader*, Vol. 6, No. 5, Winter 1986, p. 20.

TABLE 24

**SUMMARY OF FARMED SALMON PRODUCTION BY THE WORLD'S FIVE
LARGEST PRODUCERS, 1983-1987**

Year	(Tonnes)					Total	% of Change
	B.C.	Wash. State	Norway	Chile	Scotland		
1983	125	833	17,298	250	na	18,506	
1984	107	1,176	22,185	530	3,900	27,898	50.8
1985 ^c	250	1,257	27,200	1,340	6,921	36,968	32.5
1986 ^c	600	na	40,000	2,150	9,700	52,450	41.9
1987 ^c	2,500	na	55,000	2,650	14,000	61,550	17.3

^c Estimated production figures.

na Not available.

Source: British Columbia, Ministry of Agriculture and Fisheries, *The Market for Farmed Salmon: An Overview*, 1986, Table 2, p. 6.

2. Norway

Norway, the first country to export significant volumes of farmed Atlantic salmon and currently the largest producer and exporter, is a master marketer and a major competitor in fresh fish markets,⁽¹⁾ particularly in the eastern United States and on the Pacific coast of North America during the off-season when fresh-caught wild salmon are not readily available. The Committee learned that some market displacement of B.C. salmon may have occurred in Europe as well, where the Norwegians have the advantage of being close to target markets. Norwegian farmed salmon can be delivered fresh, in quantities and sizes that closely match demand. Transportation, handling and storage costs are therefore reduced.

With the support of government, salmon farming in Norway developed rapidly: from 4,389 tonnes produced in 1979 to an estimated 40,000 tonnes in 1986, an 800% increase. By the early to mid 1990s, production is projected to increase to perhaps as much as 100,000 tonnes,⁽²⁾ the West Coast's entire record production level for wild salmon. A high quality product, an effective promotion strategy, government subsidization of transportation systems linking coastal communities, and government support in the development of broodstock, are some of the factors which have been attributed to that country's marketing success. Worthy of note is that Norwegian producers have been conducting tests to determine whether live fish can be transported to the U.S. in tankers. As well, Norway has been exploring the possibility of "ranching" salmon.⁽³⁾

⁽¹⁾ About 90% of Norway's exports of farmed salmon are in fresh form.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 62.

⁽³⁾ "Europe," *Seafood Leader*, Vol. 6, No. 2, Spring 1986, p. 143.

3. Other Countries

Chile is estimated to have the potential to exceed Norway's farmed salmon production.⁽¹⁾ It currently aims at the California off-season market, and its producers are believed to benefit from low farm labour costs as well as close proximity to the American market.⁽²⁾ Chilean production, which totalled 530 tonnes in 1985, is projected to increase to 2,150 tonnes by the end of 1987. Scotland produced 6,921 tonnes of farmed salmon in 1985, and its production is projected to more than double by 1987. New Zealand, Australia, Ireland, Iceland and a dozen other countries⁽³⁾ are also expected to emerge soon as important world producers of farmed salmon. Projections of world farmed salmon production range between 198 to 242 million pounds by the year 1990.⁽⁴⁾ This should make B.C. salmon farmers very concerned about their future markets.

B. Other Products and Producers

In recent years, the West Coast fishery has become a major exporter of herring roe to Japan; in 1975 it became the leading Japanese supplier even though harvest levels have decreased substantially since the mid 1970s. As shown in Table 25, the Japanese market for herring roe is highly competitive, with a number of countries supplying it. For other species, such as groundfish, the products of the West Coast are very similar to those of other major world producers and the industry must, by and large, accept prevailing market prices.

In general, fish harvests from a number of competing countries will, in the future, increasingly affect the West Coast's traditional markets. Many factors have spurred on the growth of aquaculture in general and fish farming in particular. Among these are the dwindling stocks of some ocean fisheries brought on by overfishing, the effects of pollution on natural habitats, the extension of fishing limits to 200 miles, and scientific and technological advances in nutrition, disease control and genetics. Also important are the steady rise in demand for fish products along with corresponding price increases, and the continuity of supply, consistency of quality, and control over production (e.g., size, flesh colour, fat content, etc.) which aquaculture affords.

It is also noteworthy that the species cultivated by other countries increasingly cover a broader range of aquatic life. For example, Norwegian fish farmers are reported to be diversifying their operations to include cod, halibut and turbot.⁽⁵⁾ In the southern United States, pond-raised catfish, the fastest growing cultured finfish produced in that country, is being harvested at the rate of 100,000 tonnes a year, primarily to supply the large domestic fast food market.

Some countries, such as Norway, Iceland and Greenland, are making serious efforts to improve the efficiency of their harvesting and processing operations.

⁽¹⁾ "Tradewinds," *Seafood Leader*, Vol. 6, No. 5, Winter 1986, p. 38.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 6, 19 November 1986, p. 9.

⁽³⁾ William R. Heard and Thomas M. Kron, "Salmon Farming," *Alaska Fish and Game*, May-June 1986, p. 2.

⁽⁴⁾ *Ibid.*, p. 3.

⁽⁵⁾ "Tradewinds," *Seafood Leader*, Vol. 6, No. 5, Winter 1986, p. 38.

Investments are being made (in some cases, with government participation or encouragement) in freezing-at-sea technology, surimi production, fresh fish handling, and marketing.⁽¹⁾

TABLE 25
JAPANESE IMPORTS OF BRINED AND FROZEN HERRING ROE, 1980-1984

(Tonnes)						
Country	1980	1981	1982	1983	1984	5 Year Average
Canada						
B.C.	2,293	4,185	4,722	5,639	4,684	4,305
Atlantic	380	438	940	1,493	2,919	1,234
U.S.	3,594	4,002	4,598	5,055	4,054	4,261
S. Korea	656	1,007	732	336	375	621
China	855	469	400	916	556	639
Soviet Union	152	180	27	76	415	170
N. Korea	21	36	66	190	0	63
Finland	0	0	69	108	0	35
Other	0	0	64	238	466	154

Source: FCBC, *Trends in the Commercial Fishing Industry of British Columbia*, Vancouver, March 1986, p. 23.

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 35.

CHAPTER FIVE

Issues of Concern, Opportunities and Recommendations

SECURING A VALUABLE RESOURCE

A. The Canada-U.S. Pacific Salmon Treaty

Prosperity in the West Coast fishing industry begins with a secure resource base. The Committee's terms of reference therefore directed it to consider the bilateral Canada-U.S. Pacific Salmon Treaty signed in March 1985 on the management of all five Pacific salmon stocks originating in each country's waters.⁽¹⁾ The result of almost 15 years of negotiation, the Treaty established a Pacific Salmon Commission to advise each country on matters pertaining to it and to serve as a forum for annual management plans for major intercepting fisheries. Three panels, assigned to particular regional fisheries along the coast, were also created to provide management advice to the Commission. The Treaty calls for each country to manage the stocks originating in its own rivers, to prevent overfishing, to increase production and receive benefits commensurate with this national production,⁽²⁾ except where traditional fishing patterns intervene. In implementing the two principles of conservation and equity, it directs the Pacific Salmon Commission to recognize the desirability of reducing and balancing interceptions.⁽³⁾

Last year (1986) was the first year in which the salmon fisheries of both countries were managed according to the recommendations of the Pacific Salmon Commission. Preliminary analysis by Canadian officials has revealed that salmon interceptions significantly favoured the United States in 1986, although perhaps less so than if no Treaty restraints had been placed on American fishermen.⁽⁴⁾

⁽¹⁾ Special reference is also made to anadromous steelhead trout.

⁽²⁾ *Treaty Between the Government of Canada and the Government of the United States of America Concerning Pacific Salmon*, Ottawa, 28 January 1985, in force 18 March 1985, Article III, para 1.

⁽³⁾ *Ibid.*, para. 3.

⁽⁴⁾ Department of External Affairs, Letter to the Chairman, 30 January 1987.

In view of the imbalance in salmon interceptions between Canada and the United States during the Treaty's first year of implementation, the Committee recommends:

- (1) **That the Canadian Section of the Pacific Salmon Commission vigorously pursue negotiations with its United States counterpart to reduce further American interceptions of salmon of Canadian origin so as to ensure that Canada gets its rightful share of the harvest. The Department of Fisheries and Oceans should also undertake a review of the overall impact of the Canada-U.S. Pacific Salmon Treaty at the end of 1987, and each year thereafter. The results of this review should be made available to the general public.**

With the signing of the Treaty, new programs were initiated by the Government of Canada, including large-scale mark recapture programs. The Committee wishes to stress the importance of these initiatives in determining whether Canada's share of the salmon harvest is in proportion to the quantity of salmon produced in its coastal waters.

B. Yukon River Salmon Stocks

The Yukon Territory shares with the State of Alaska the Yukon River, the largest watershed in Alaska and Yukon Territory and the fifth largest in North America in terms of area and mean discharge.⁽¹⁾ The chinook and fall chum, the major species which migrate along the Canadian section of the Yukon to spawn, travel the longest known route in the world, some 3,680 km, from streams in northern B.C. to the United States territorial waters in the Bering Sea. About 41% of the river's drainage area is within Canadian territory.

A commercial fishery which harvests chum and chinook salmon operates near Dawson City along the Yukon River's main branch and in the lower sections of the Stewart and Pelly Rivers. A native food fishery scattered throughout the Yukon drainage system is not only an intrinsic part of native culture, but also provides sustenance for more than 6,000 native residents.⁽²⁾ A small non-native subsistence fishery is also permitted in the same area as the commercial fishery. Because of improved road access to remote areas, participation in the sport fishery for Yukon chinook salmon has also increased over the years.

Although the primary industries in the Territory are tourism, mining and government, tremendous interest was expressed in broadening the economic opportunities of the fisheries. Discussions about fishing, processing and marketing commercial products, as well as marketing tourism and sport fishing in the area, however, led to the more fundamental issue of supply.

The signing of the Pacific Salmon Treaty between Canada and the United States in 1985 was said to have been opposed by the Yukon Territorial government and by various interest groups at that time because of the Treaty's failure to address the issue of equitably apportioning Yukon River salmon stocks between the two countries.⁽³⁾

⁽¹⁾ Department of Fisheries and Oceans, *Pacific Region Salmon Stock Management Plan: Northern Transboundary Rivers*, Discussion Document, Vol. J, 1986, p. 33.

⁽²⁾ Department of Fisheries and Oceans, *Salmon Resources of the Yukon River* (undated).

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 3, 14 November 1986, p. 48-49.

Currently, Canadian fishermen on the Yukon River obtain a very small catch of fall chum and chinook compared with American catches of the same species (Table 26). Article VIII of the Treaty, which deals with the Yukon River, states that "the parties shall initiate in 1985, and conclude as soon as possible, negotiations" on four major issues: an account of American harvests of Canadian salmon; cooperative management procedures; cooperative research programs, enhancement opportunities and exchanges of biological data; and development of an organizational structure to deal with Yukon River issues.

Since 1985, several rounds of negotiations between Canada and the United States have failed to bring about a settlement on the issue of catch allocations between the two countries. Canada's position has been that management mechanisms for the river should be incorporated into the existing Pacific Salmon Treaty, under which each country is to receive benefits in proportion to the quantity of salmon originating in its waters ("the equity principle"). It is generally accepted that the Canadian portion of the Yukon River produces approximately 50% of the fish. Current Canadian catches are well below this level: it is estimated that 90% of the chinook harvest and 95% of the chum in-river catches are taken by fishermen in the United States, leaving only about 10% of chinook and 5% of chum stocks for Canadian fishermen.⁽¹⁾

After meeting with the joint Alaskan House and Senate Resources Committee in early February 1987, our Committee concluded that the two countries are far apart in agreeing on an equitable allocation. The Americans propose a separate agreement to handle the Yukon River, and maintain that the equity principle does not apply because of the size and economic importance of the well-established fishing industry in Alaska. Under the present catch allocations, which favour the United States, an expansion of the Canadian fishery could only lead to a reduction of salmon escapement, a situation which the Committee regards as unacceptable.

This Committee believes that Canadian native, subsistence, sport and commercial fishermen are entitled to more of the in-river catch of Yukon River salmon, and believes the issue should be moved up on the political agenda. It recommends:

- (2a) That the Minister of External Affairs express, through the most effective diplomatic channels available to him, Canada's disagreement with the American position on the critical issue of equitably sharing the salmon stocks of the Yukon River.**
- (2b) That Canadian negotiators for the Yukon River base the Canadian negotiating position on Article III, paragraph 1(b) of the Pacific Salmon Treaty which states that each party to the Treaty will receive benefits equivalent to the production of salmon originating in its waters.**

C. The Transboundary River Salmon Stocks of Northern B.C.

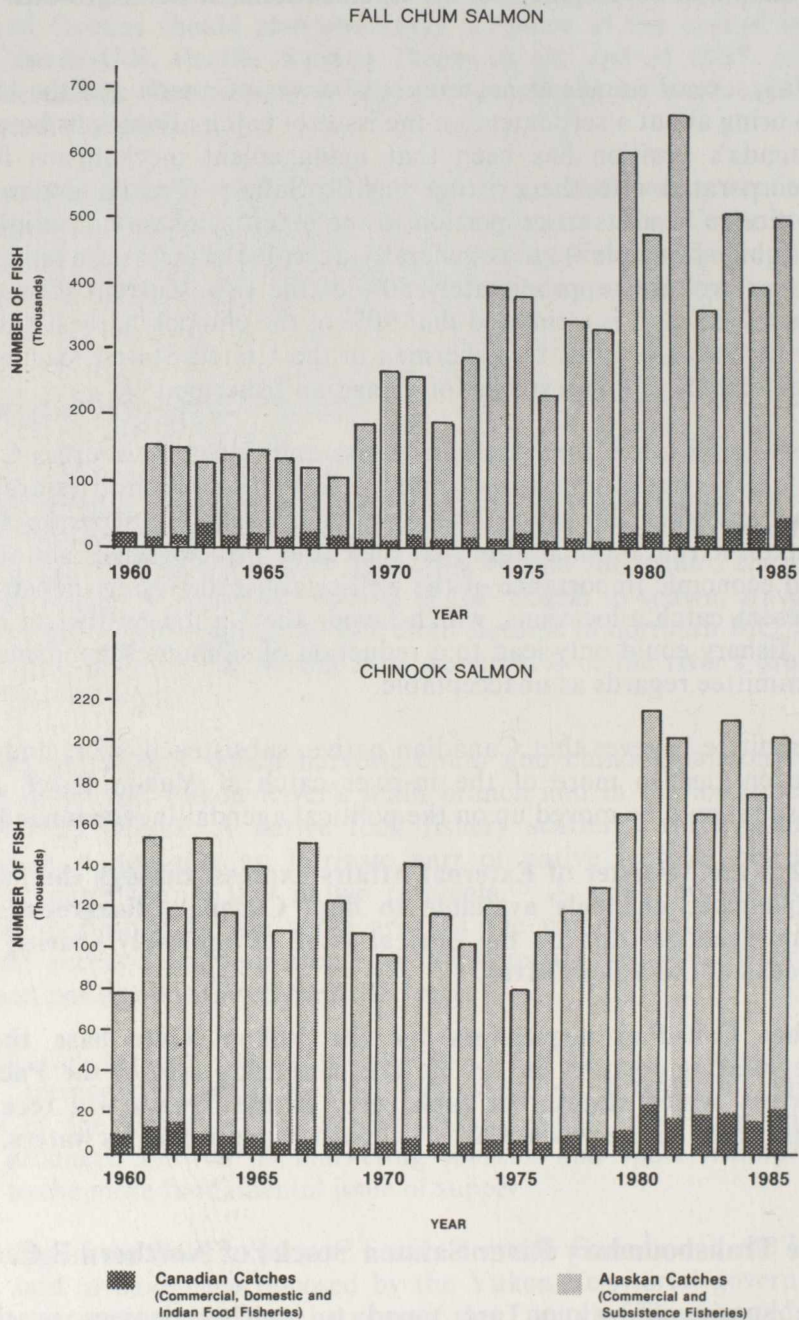
All five species of salmon are found to varying degrees in the so-called transboundary rivers of B.C., the systems of which originate in Canada but flow into Alaskan coastal waters (Figure 3). Major transboundary rivers include the Taku, the Stikine and the Alsek, which have approximately 95% of their drainage systems within Canadian territory.⁽²⁾ Other, smaller rivers include the Unuk, Whiting and Chilkat. A

⁽¹⁾ Department of External Affairs, Letter to the Chairman, 30 January 1987.

⁽²⁾ *Pacific Region Salmon Stock Management Plan*, 1986, p. 1, 12, 25.

TABLE 26

CANADIAN AND ALASKAN TOTAL CATCH OF FALL CHUM AND CHINOOK SALMON ON THE YUKON RIVER, 1960-1985



Source: Department of Fisheries and Oceans, *Salmon Resources of the Yukon River*, undated.

Source: Department of Fisheries and Oceans, *Salmon Resources of the Yukon River*, undated.

Canadian commercial gillnet fishery on the Taku River, directed primarily at sockeye, chum and coho salmon, has been in existence since 1979. The Canadian commercial fishery for Stikine River salmon stocks, which focuses on sockeye salmon, began in 1975, but operated at a low level until 1979 due to the limited market demand and lack of processing and storage facilities in the area. At present, there is no Canadian commercial fishery on the Alsek River. Native food and sport fisheries are present to varying degrees along all these rivers.

Until the advent of commercial fishing on these rivers in the mid to late-1970s, all commercial production accrued to the United States. A Canadian from the transboundary rivers, a member of the Northern Panel of the Pacific Salmon Commission, who testified before the Committee believed that these waterways were not fairly dealt with during the 1985 Pacific Salmon Treaty negotiations and were essentially "traded off"⁽¹⁾ by Canadian negotiators for concessions elsewhere in B.C. Canadian negotiators have encountered great difficulty in getting the United States to accept the equity principle on these waterways. Until recently, Canada allowed the State of Alaska to conduct research and to manage the stocks of these rivers and American journals and reports have referred to these rivers as primary U.S. salmon-producing areas. Moreover, the United States has claimed 50% of all Canadian-produced fish in these rivers because of the freshwater and estuarine rearing habitat which they maintain to allow the fish to grow and return to the rivers to spawn.⁽²⁾

Table 27 compares average catches by Canadian and American gillnet fisheries of Canadian salmon originating from the three major transboundary rivers in northern B.C., and the percentages of the total catch of Canadian stocks received by Canada both before and after the Treaty. On the Stikine River, the Canadian harvest for 1985-86 was set at 35% of the total sockeye allowable catch, or 10,000 fish, whichever was greater, and 2,000 coho salmon. On the Taku River, the Canadian sockeye harvest was set at 15% of the total allowable catch. The Committee was made aware of the fact that there are other transboundary rivers such as the Alsek, the Unuk, the Whiting and Chilkat, for which Canada receives no benefits under the Treaty. These rivers were believed to make significant contributions to the American catch.⁽³⁾ In view of this, the Committee recommends:

(3a) That the Government of Canada demand that the equity principle, Article III, paragraph 1(b) of the Canada-U.S. Pacific Salmon Treaty, be a priority in future negotiations with the United States on the salmon stocks of the transboundary rivers.

Estimates of total annual production for these rivers were believed to be anywhere between two and five million salmon.⁽⁴⁾ More research should be undertaken, given that escapement and productivity data for most stocks are either inconsistent or limited.⁽⁵⁾ More complete information would undoubtedly better support Canada's case in future negotiations. The Committee therefore recommends:

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 3, 14 November 1986, p. 88.

⁽²⁾ *Ibid.*, p. 94.

⁽³⁾ *Ibid.*, p. 95.

⁽⁴⁾ *Ibid.*, p. 89.

⁽⁵⁾ *Pacific Region Salmon Stock Management Plan* (1986), p. 1, 12, 25.

FIGURE 3—NORTHERN BRITISH COLUMBIA



Source: Canada, Department of Energy, Mines and Resources, Surveys and Mapping Branch, Map MCR3 (British Columbia), 3rd edition, 1973

- (3b) That the Department of Fisheries and Oceans provide adequate funding for research to increase its data base for the region's transboundary river salmon stocks.

TABLE 27

COMPARATIVE AVERAGE CATCHES OF CANADIAN SALMON ORIGINATING IN THE TRANSBOUNDARY RIVERS BY CANADIAN AND AMERICAN GILLNET FISHERIES, 1981-1985

(Average catches in thousands of pieces)

River	Species	U.S. in-river or terminal catch	Estimated U.S. interception ¹	Canadian in-river catch	Total catch of Canadian salmon	Average percentage to Canada (%)	Pac. Sal. Treaty % to Canada ²
<i>Alsek</i>	Chinook	0.3	0.3	0.4	0.7	57.1	not
	Sockeye	18.0	16.2	3.0	19.2	15.6	negotiated
	Coho	7.1	6.4	0.1	6.5	1.5	
<i>Taku</i>	Chinook	2.1	2.1	0.4	2.5	16.0	incidental
	Sockeye	65.8	55.9	17.4	73.3	23.7	15%
	Coho	32.7	22.9	4.8	27.7	17.3	incidental
	Pink	177.7	151.0	5.7	156.7	3.6	incidental
	Chum	64.6	38.8	2.5	41.3	6.1	incidental
<i>Stikine</i>	Chinook	1.6	1.4	1.8	3.2	57.0	incidental
	Sockeye	160.1	42.4	23.7	66.1	35.9	35%
	Coho	60.3	42.2	6.7	48.9	13.7	2000 pieces
	Pink	324.9	32.5	2.3	34.8	6.6	incidental
	Chum	44.6	8.9	0.7	9.6	7.3	incidental

¹ Rough estimates. Major interceptions, particularly of chinook and coho, occur in Alaskan troll fisheries and are not accounted for in the table (e.g., somewhere between 50% and 70% of the coho catch is taken by the fishery.)

² Percentages do not reflect new spawning escapement guarantees.

Sources: Department of Fisheries and Oceans, brief submitted to the Committee, 14 November 1986, Table 1; Representative of Transboundary Rivers, Northern Panel of Pacific Salmon Commission, Issue No. 3, 14 November 1986, p. 95.

D. Foreign High Seas Interceptions

Also important are the incidental catches of Canadian salmon by foreign fishing vessels on the high seas, outside Canada's 200-mile limit. In the past, both Canada and the United States have attempted, directly and through the International North Pacific Fisheries Commission, to influence the Japanese in particular to moderate their fishing effort. DFO is at present conducting a series of research cruises to the North Pacific to determine whether international high seas squid fisheries represent a serious threat to Canadian salmon. The Committee believes the issue of high seas interceptions is of sufficient importance to justify such actions to improve the Department's data base, and recommends:

- (4) That the Department of Fisheries and Oceans continue to pursue its data-gathering program on foreign interceptions of Canadian salmon on the high seas. Consideration should be given to further strengthening the Department's monitoring capability on the high seas.

E. The A-B Line

Concerns were expressed in Prince Rupert over the possibility of Canada's negotiating the maritime boundary in the Dixon Entrance between the southern limit of the Alaskan panhandle and the province of B.C. It is Canada's position that the latitudinal boundary, known as the A-B line, is the international boundary for both land and water inside the Dixon Entrance,⁽¹⁾ as shown on Figure 4. The United States has taken the position that the maritime boundary should follow a median line farther south, more or less equally dividing the waters of the Entrance between Canada and the United States.⁽²⁾

Canadian fishing interests in the region testified that a shift of this international boundary between Canada and the United States would dislocate Canadian fishermen of halibut and other groundfish from their traditional fishing grounds, and make Canadian herring and salmon stocks more susceptible to American interceptions, especially of sockeye and pink salmon, which migrate through the area on the way to spawn in Canadian waters. One group stated that, while there is a general obligation in the Canada-U.S. Pacific Salmon Treaty to cover unforeseen interceptions not specified by the Treaty, it is unclear whether this would apply if there were a change in an international boundary.⁽³⁾

With respect to the foregoing, and given the importance of existing and potential fisheries to the economic and general welfare of the people in northern B.C., the Committee recommends:

- (5) That the federal government reaffirm Canada's long-standing position that the A-B Line is the international boundary for both land and water inside the Dixon Entrance.**

With respect to other maritime boundary disputes between Canada and the United States,⁽⁴⁾ the long-term interests of existing or potential fisheries in these areas suggest that boundary lines should take into account the interests of Canadian fishermen, and that each boundary area should be negotiated separately in the light of its unique characteristics and circumstances.

F. Fish Habitat

The issue of fish habitat protection was often raised before the Committee, particularly in reference to the decline of certain stocks of salmon, the most valuable species in the region. Most development activities are limited to river valleys and impinge on the vital estuarine and freshwater environments on which salmon depend in

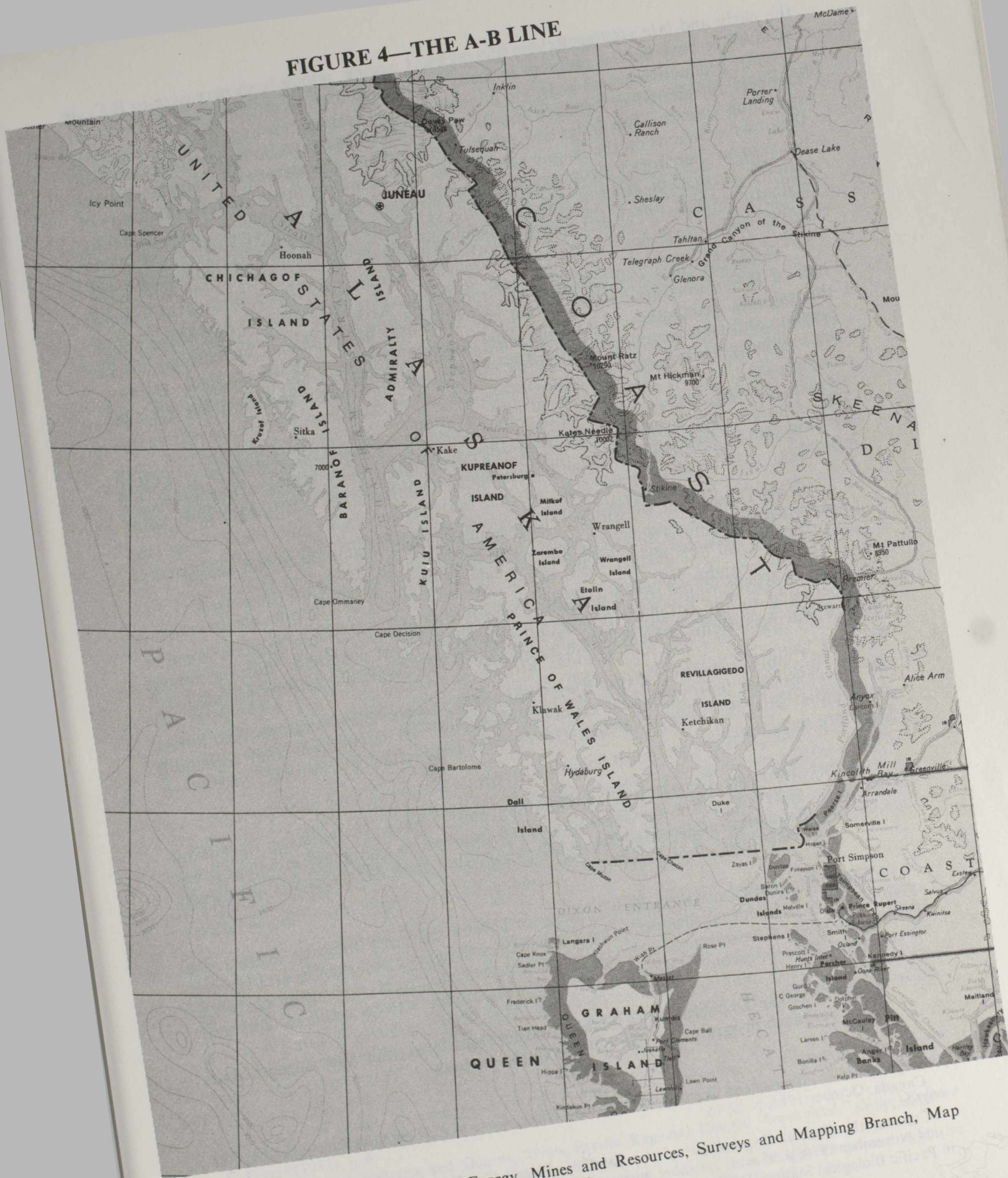
⁽¹⁾ Outside the Dixon Entrance, Canada adopted an equidistance line for fisheries purposes in 1977, but did so expressly without prejudice to negotiations with the United States and to the determination of the single maritime boundary that will divide both the fisheries and continental shelf jurisdictions of Canada and the United States.

⁽²⁾ Department of External Affairs, brief submitted to the Chairman, 10 November 1986, p. 10.

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 4, 17 November 1986, p. 62.

⁽⁴⁾ These involve the maritime boundary beyond the Strait of Juan de Fuca between B.C. and the State of Washington and the boundary between the Yukon and the State of Alaska in the Beaufort Sea.

FIGURE 4—THE A-B LINE



Source: Canada, Department of Energy, Mines and Resources, Surveys and Mapping Branch, Map MCR3 (British Columbia), 3rd edition, 1973

the early and late stages of their life cycles. Logging, which is so pervasive in B.C., is believed to have been a problem in many areas, denuding river banks and allowing silt to cover productive gravel beds. On another front, diversions for hydro-electric purposes compete for shared or primary use of watersheds, blocking the homing migration of spawning salmon. The irrigation needs of farms and the mining industry also make their own demands on the fragile watersheds. Placer mining operations, the mainstay of the Yukon Territory's economy and the focus of much discussion, were generally believed to disrupt streams for spawning salmon, causing siltation which smothers incubating eggs, alters the feeding behaviour of young fish, and reduces aquatic productivity.

Along the final 100 kilometres of the Fraser River drainage basin, where about half of B.C.'s inhabitants live, urban and industrial developments increasingly affect the region's production of salmon. Port developments and marinas, road, railway, pipeline and transmission line construction also threaten fish habitats, while oil spills are another potential hazard.

In October 1986, a new federal policy statement was tabled, calling for an overall "net gain" in fish habitat productivity through habitat conservation, restoration and development.⁽¹⁾ Fundamental to the new policy is the "no net loss" principle, under which:

[The] Department will strive to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss or damage may be prevented.⁽²⁾

Some groups feared that a procedure whereby damage to salmon habitats would be compensated for by hatchery production elsewhere might eventually destroy natural fish-producing systems, which, unlike hatcheries or fish farms, are self-maintaining.⁽³⁾

The Committee is aware that it may not always be possible or even sensible to halt all development that promises economic benefits, yet recognizes that enhanced production will not always adequately replace production by natural systems. It therefore recommends:

(6a) That the Department of Fisheries and Oceans, in pursuing its habitat policy, disallow developments which impinge on fish habitats unless it can be shown, after extensive public input, that such developments are clearly in the interest of Canada.

Three departmental research programs on habitat currently focus on salmon: the Fish/Forestry Interaction Program, the Fraser River Program, and the Coastal Habitat Program.⁽⁴⁾ The Committee wishes to stress the importance of such research to the West Coast fishery, given the dependence of salmon on their habitats, and recommends:

(6b) That the Department of Fisheries and Oceans expand and strengthen its research programs on fish habitat in the region.

⁽¹⁾ Department of Fisheries and Oceans, *Policy for the Management of Fish Habitat*, Supply and Services Canada, October 1986, p. 12-15.

⁽²⁾ *Ibid.*, p. 14.

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 9, 24 November 1986, p. 88.

⁽⁴⁾ Pacific Biological Station (DFO), brief, p. 17.

MANAGING A VALUABLE BUT LIMITED RESOURCE

A. Consultative Arrangements Between DFO and Commercial, Sport and Native Fishermen

The harvesting sector in B.C. operates in a complex environment with many sport and recreational fishing groups, commercial groups based on particular fisheries or gear types, and native people who have historically fished in the area. The Committee was made aware of the conflicting interests of these groups, each intensely competing for a limited common property resource, and each wanting to see the government policies reflect a commitment to protect and develop its own particular fishing activity.

The question of the allocation of the salmon resource is particularly contentious. Not only are the commercial trollers and sport fishermen competing for the same fish, but as the net fishery concentrates on one species such as sockeye, it often harvests other hook-and-line species such as chinook, as a by-catch.⁽¹⁾ The friction between user groups, in turn, is aggravated by low incomes and the recurrent economic difficulties associated with fishing.⁽²⁾ Although DFO's objective in allocating the resource is to ensure that conflicts are minimized and that disparate interests are dealt with equitably, the Committee learned that in the past some groups had taken the Department to court to challenge its decisions on fish allocations.

Government cannot properly manage the resource and fishing activity without outside advice, specialized knowledge and cooperation. During the last decade, DFO created on the West Coast a plethora of consultative committees, advisory boards, task groups and other channels to liaise, inform and initiate debates within the industry, to develop allocation and management plans based on user group consensus, and to advise the Department on both general and specific matters. For most of 1986, the senior consultative body for the Pacific region was the Minister's Advisory Council (MAC) consisting of representatives of fishing organizations and the processing sector who gave general advice to the Minister on a broad range of issues, including fish allocation.

Although the MAC's membership was intended to reflect the main interests of the Pacific fishery, the Council was criticized by some groups for faulty procedures and for not being representative of the various industry sectors. This was said to have resulted in an inequitable allotment of the total catch to native, sport and commercial fishermen, and to the different commercial gear sectors. The Committee learned that several groups had withdrawn their support of MAC for this reason.

A new structure for the Pacific fisheries consultation process was announced on 31 October 1986.⁽³⁾ It consists of the Pacific Regional Council (PARC), a 12-member advisory body representing commercial gear sectors, the processing industry, native interests, and the sport fishing sector.⁽⁴⁾ The PARC is intended to be a forum for discussing strategic policy issues; four species committees (salmon, groundfish, herring, shellfish), supported by local advisory groups, will be responsible for fisheries allocation plans and management issues.

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 9, 24 November 1986, p. 50.

⁽²⁾ Pearse (1982), p. 6.

⁽³⁾ Department of Fisheries and Oceans, "New Pacific Regional Council Announced," *News Release Communiqué*, (NR-HQ-86-81E), 31 October 1986.

⁽⁴⁾ Six members from the commercial fishing and processing industry, three members representing native interests, and three from the sport fishing sector.

The Committee supports these initiatives to restructure and improve the consultative process among user groups and between these groups and the Department, and supports the principle that there should be increased dependence on their advice on matters relating to the complicated and controversial issue of fisheries management. It also believes that an effective consultative organization close to the Minister should be broadly representative of various interests in the fishery, and therefore recommends:

- (7) That the Minister of Fisheries and Oceans periodically review the composition of the PARC, as well as user group representation on other consultative bodies to ensure that all groups are equitably represented.**

B. Long-Term Planning

The Committee was surprised to learn that there was no overall policy framework, long-term plan, or set of priorities and strategies to guide government and the fishing industry. It was impressed with the views of one witness who stated that:

First, a vision is lacking – no one seems to understand the purpose of the various actions taken by government because government itself doesn't seem to have any idea about the kind of future its activities are supposed to create. It is not surprising, therefore, that lacking a vision of the future, there is no policy framework in place. Without a policy framework, there is little left but issue management, with priorities determined on the basis of today's pressure points.⁽¹⁾

The complex problems of fisheries management on the West Coast cry out for a plan predicated on long-term objectives and priorities, if DFO is to fulfill its mandate of conserving the resource and maximizing economic and social benefits in the fishery. The Committee therefore recommends:

- (8) That the Department of Fisheries and Oceans, in cooperation with the province of B.C., and in consultation with the fishing industry and the PARC, develop long-term plans and objectives for managing the West Coast fishery.**

C. Allocating Salmon within the Commercial Fishery

The commercial salmon fishery competes for a limited resource; each gear sector staunchly defends its share of the resource on the basis of its historical level of harvest. Net earnings among seine, troll and gillnet vessels are believed to differ considerably because of the varying capacity of vessels in each gear type, and because the species of salmon fished by each differs in value. One group brought to the Committee's attention the fact that:

The DFO, it appears, has given in to lobbyists on catch allocations, and there also appears to be serious inequities in the percentages of salmon allocated to the different gear types. . . The gillnet fishery has exclusive fishing areas such as the major rivers and inlets. Where the gillnets and seine fish the same area, the gillnets get, at the very least, the same amount of fishing time but, in many cases, they get more fishing time. This leads to very serious inequities in the distribution

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 5, 18 November 1986, p. 20-21.

of . . . fish per person. Reports of gillnet and troller gross earnings equalling or bettering the gross earning of seine boats is inequitable in itself, because the gross earnings of seines must be shared by the five crew members, and on the troller and gillnetter, the gross earnings don't have to be shared with as many.⁽¹⁾

The Committee agrees with a suggestion that a study on the per capita economic returns generated by the various gear types in the commercial sector should be conducted to aid policymakers in making fish allocation decisions, and recommends:

- (9) **That the Department of Fisheries and Oceans conduct or commission a comprehensive economic analysis of the distribution of net income generated by the various gear types within the commercial sector.**

D. Overcapacity in the Commercial Fleet

An important issue faced by the commercial fishery is the overcapitalized state of its fleet. There is far more fishing capability than needed to harvest the available fish, either now or in the foreseeable future. Estimates are that the total harvest on the West Coast could be taken with about one-half of the present fleet.⁽²⁾ The Auditor General's report recently noted that, while the number of fishing vessels in the fishery dropped to 4,400 from 6,000 in the last 15 years, catching capability increased dramatically through upgraded vessels or technological improvements.⁽³⁾

The problem of overcapacity, which occurs in other regions of Canada as well, stems from the "common property" nature of the resource: fish become the private property of a fisherman only once they are caught and removed from the water. This tends to result in a "free-for-all" race for limited fish stocks, creating the well-documented phenomenon of "too many fishermen chasing too few fish." In good fishing years, such as the 1985-86 fishing season in the region, fishermen have economic incentives to increase their share of the catch and invest in bigger boats, better gear and more sophisticated equipment in anticipation of future catches. In poor fishing years, fishermen find it difficult to earn adequate returns on their investments.

The current situation of overcapacity is widely believed to curtail the fishing season. For example, the 1986 herring fishery was open an average of 15 hours in three areas.⁽⁴⁾ In 1986, a fishery for the Adams River sockeye landed 650,000 fish in two and a half hours.⁽⁵⁾ A fleet with too much capacity also increases the potential for overfishing, intensifies the competition between the various fishing groups, makes monitoring by DFO more difficult, and dissipates wealth. The Auditor General concluded that:

[The] total processing and harvesting costs (boats, fuel, employees, plants and equipment) and the government costs of the fishery are approximately equal to the value that the fish produces. Thus, under the current management and regulatory framework, the average fisherman, the government, and the taxpayer are barely breaking even with this valuable resource.⁽⁶⁾

⁽¹⁾ *Ibid.*, Issue No. 5, 18 November 1986, p. 32.

⁽²⁾ *Ibid.*, Issue No. 2, 7 November 1986, p. 16.

⁽³⁾ Auditor General, *Report*, 1986, para. 10.25.

⁽⁴⁾ *Ibid.*

⁽⁵⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 42.

⁽⁶⁾ Auditor General, *Report*, 1986, para. 10.30.

In the past, a number of solutions have been proposed to resolve the problem of overcapacity⁽¹⁾ such as a \$100 million buy-back program partly funded by fishermen, which was recommended by the Minister's Advisory Council but never acted upon. The Pearse Commission suggested in 1982 that a government-appointed board should withdraw a number of fishing licences by offering compensation to licensees, thus reducing the total number of fishermen involved in the salmon and roe herring fisheries.⁽²⁾

Although the Committee recognizes that fleet rationalization would be very difficult, DFO currently does not have a strategy to address the issue. The Committee therefore recommends:

- (10) That the Department of Fisheries and Oceans develop and implement plans, directions or priorities, in consultation with the fishing industry, that would reduce overcapacity in the fishing fleet.**

Consideration should be given to implementing an area licensing scheme in the salmon fishery for all gear types. This would be similar to the scheme in use in the herring fishery since 1981 which helped reduce "the overall number of boats and capacity that participated in each area fishery."⁽³⁾ The Department should also address the issue of whether it is desirable to define some concept of an "ideal fleet." The solution to this difficult problem would involve a lengthy period of time as well as agreement on a wide spectrum of economic and social issues, such as whether native ownership of commercial fishing vessels should be increased.

E. Recognition of the Sport Fishery

The many briefs submitted by sport fishermen in the region often stated that DFO's policy had been largely to ignore or even discourage the sport fishery while concentrating its expenditures, programs and resource allocations on the commercial sector. Arguments by the various sport fishing interests repeatedly emphasized the importance of their fishery compared with that of the commercial sector. Cited were the dollar values generated per sportfish landed, the high costs associated with commercial fishing, the economic spin-offs generated by the recreational fishery, the size of its fleet (nearly double that of the commercial fleet) and its low consumptive nature.

Many submissions by sport fishermen proposed that the *Fisheries Act* be amended to recognize the fishery as an important and legitimate user of the resource. The Committee learned that, in recent years, the fishery had been subject to closures and restrictions in some areas in the interests of resource conservation. While commercial fishermen seemed to have few problems with purely recreational small boat fishermen, they were concerned about the rapidly expanding commercial recreational fishery by individuals who, like themselves, depend on the resource for their livelihood.

A substantial portion of the foreign and domestic tourism industry on the West Coast is undoubtedly fisheries-related. Recreational fishing in Canada is believed to have generated about \$4.7 billion in 1985,⁽⁴⁾ an increase of 75% over 1980 after adjusting for inflation. Of this total, it is estimated that the activity on the West Coast

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 17.

⁽²⁾ Pearse (1982), p. 114.

⁽³⁾ Auditor General, *Report*, 1986, para. 10.34.

⁽⁴⁾ Department of Fisheries and Oceans, *Annual Report 1985/86*, Year Ending 31 March 1986, Supply and Services Canada, 1987, p. 24.

represented about \$400 million⁽¹⁾ in terms of direct expenditures on goods and services such as food, lodging and transportation, and direct investments on equipment.

A great deal more information exists on the economic profile of the commercial sector than on that of the sport fishing sector. A report by the Canadian Wildlife Federation recently noted that since few studies have been undertaken to determine the value and nature of the activity in the region, government programs and regulations have perhaps "been biased toward the commercial sector."⁽²⁾ The dearth of information resulted in much controversy during the Committee's hearings as to which sector generates more benefits to the economy. The Committee therefore recommends:

- (11a) That the Department of Fisheries and Oceans undertake a comprehensive study to determine the relative economic and social importance of the sport and commercial fisheries of the region.**

The Committee is, however, sufficiently convinced that the sport fishery is a qualified user of the fish resource. While economic arguments are important, they alone will not decide the future role, size and relative economic importance of the fishery; economists have always argued about the value of the activity, and will continue to do so. In any case, recreational fishing is not just an economic activity, it is part of a total wildlife experience.

In view of the above, the Committee recommends:

- (11b) That the federal government amend the *Fisheries Act* to recognize the sport fishery as a legitimate user of the resource deserving a fair, but not unlimited, allocation of the available fish.**
- (11c) That recognition of the sport fishery's economic and social importance be reflected in the budget and resources of the Department of Fisheries and Oceans.**

Some unequivocal comments from sportfishing representatives were also made with respect to the incidental catch, by net fishermen, of non-target chinook, coho and steelhead stocks. For some, commercial net fisheries should be allowed only in areas where there are no mixtures of target and non-target stocks. Others advocated the total removal of commercial seiners and the roe herring net fisheries, and the reduction of gillnet fishermen. With improved management techniques that promote more discriminating harvesting in the fishery,⁽³⁾ the Committee believes there is room for both sport and commercial fishermen.

It therefore recommends:

- (11d) That the Department of Fisheries and Oceans develop and promote, jointly with the sport and commercial fishermen, new methods to reduce the incidental catch of fish stocks in the mixed stock fishery.**

F. Native Demands

In recent years, there have been native demands for a greater share of the salmon resource, as a means of both redressing perceived historical wrongs and promoting

⁽¹⁾ Department of Fisheries and Oceans, Economic Analysis and Statistics Division, 9 July 1987.

⁽²⁾ F.W.H. Beamish, P.J. Healy and D. Griggs, *Freshwater Fisheries in Canada: Report on Phase 1 of a National Examination*, Canadian Wildlife Federation, Ottawa, October 1986, p. 48.

⁽³⁾ And salmonid enhancement, discussed in a later section of this report.

economic self-sufficiency in native communities. The Committee learned that DFO had made arrangements for some native bands to monitor fish stocks and protect fish habitats in keeping with their interest in exercising management control of the resource. The Committee was also made aware of the many dimensions of the issue of native fishing rights.

Since native food fishing tends to occur up-river, it is sometimes difficult for fisheries managers to guarantee a sufficient number of fish for this purpose. The issue will likely become more salient since a greater demand for food fish is anticipated with the enactment of Bill C-31, which may eventually increase the current population of status Indians as non-status Indians are reinstated by bands.

Many native groups also expressed an interest in establishing their own small processing and cold storage facilities and in some commercial use of their salmon food fish to promote economic opportunities in their communities, which are plagued by high unemployment. Native groups saw current fishing regulations, which recognize the right of natives to fish for subsistence, but not for sale, barter or traffic, as interfering with their aboriginal rights to fish, and with the traditional native system of bartering. Whether to allow the sale of food fish was a particularly contentious question since it was widely believed that an expansion of the inland fishery could reduce the stocks of salmon available to commercial and sport fishermen.

Just as contentious and before the courts, was the issue of band by-laws allowed under section 81 of the *Indian Act*, which permit native bands to manage fish on reserves. Whether the *Indian Act* supersedes the *Fisheries Act* is not yet clear. Fishing rights also tend to be an important component of native land claims, and some non-native fishermen voiced their concern that government might resolve land claims issues by giving native groups the right to manage and market the salmon resource which passes through their reserves.

Groups from the established fishing industry opposed the idea of allowing native fishermen to market salmon caught in inland areas. They argued that this would reduce the stocks of salmon available to them, and that salmon harvested in freshwater are in too poor a physiological condition to produce competitive and good quality end-products. As well, it was mentioned that fish inspection services would have difficulty in coping with an enlarged processing sector.

The issue of native fishing rights has many different dimensions, including implications for marketing. The legal merits of native claims are, however, outside the Committee's terms of reference. The Committee therefore recommends:

- (12) **That the federal government move to clarify the rights of native people to participate in and manage the fisheries of the region.**

G. The Controversy Generated by the Aquaculture Sector

Although detailed data on the economic and financial benefits generated by the emerging salmon farming industry have not been collected, a number of witnesses, particularly from the coastal communities, expressed an interest in the activity as a means of furthering employment and revitalizing local economies. Several stated that, with its 27,000 km of coastline, the province of B.C. is ideally suited for the development of a thriving industry, especially in the climatic and oceanographic conditions of the northern coast.⁽¹⁾ In fact, some claimed that the sector's potential in

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 4, 17 November 1986, p. 38.

B.C. may be greater than in Norway, the world's largest producer of farmed salmon, because of the province's superior water conditions, hardier stocks of wild salmon, and closer proximity to markets in the United States and Asia.

While the future market opportunities of aquaculture indeed appear to be promising, the Committee was made aware of the concerns of commercial fishermen and other groups about possible damage that intensive fish farming could do to the health of existing wild salmon stocks and the environment. A number of submissions suggested that diseases might be transmitted from farmed fish to wild stocks and other plants and animals, although others argued that there was no scientific evidence to support such a notion. Disease-related problems, however, were believed to have occurred elsewhere, for example in Norway, where, in the past, overcrowding of fish farm sites had led to new regulations restricting the size and concentration of fish farms. Also discussed was the threat that importation of Atlantic salmon eggs might pose for transmitting diseases to the region's wild Pacific stocks.

Related to this issue was concern over the rapid growth of the sector and the adequacy of disease diagnostic and veterinary services, in which there has so far been little private sector involvement because of the small market and the high costs of entry. The Committee was, however, pleased to hear that, with the projected expansion of the industry, the private and public sectors are now responding to these industry needs.

The proliferation of fish farms was also seen by some groups as a potential threat to the coastal tourism industry, decreasing the aesthetic and economic values of frontage property, disrupting fishing sites, and taking away sheltered anchorage areas which are vital to the safety of recreational boaters and commercial fishermen. The need for coastal planning measures and prior consultation with other users of the foreshore and offshore areas was therefore identified. Native groups were also concerned that their interests were being ignored in the frantic rush for development.

Of concern, and a source of frustration to some individuals wishing to establish an aquaculture operation, was the large number of provincial agency and federal government permits or approvals required by aquaculturists and the cumbersome procedures for obtaining them.⁽¹⁾

Because of these and other concerns expressed by fishermen, aquaculturists and environmentalists, and in response to a provincial moratorium on the issuing of foreshore Crown leases and licences of occupation, a provincial government inquiry was established on 6 November 1986 to review the fish farming industry. The subsequent report,⁽²⁾ directed primarily to the provincial government, made more than 50 recommendations.

Although the Committee concurs with that report's proposals, it is somewhat concerned that a 30-day inquiry may not have provided sufficient time to address fully all the questions raised on the possible impacts of fish farming and the conflicts it poses. The aquaculture industry in B.C. is in an early stage, and the many controversies it has generated (for example, whether Salmonid Enhancement Program hatchery eggs, particularly chinook salmon eggs, should continue to supply the industry) demonstrate an immediate need for a clear and comprehensive development policy. Such a policy is needed to offset the industry's image of an uncontrolled "gold rush" and to promote better understanding between aquaculturists and commercial fishermen. Although the

⁽¹⁾ The required number of permits or approvals varies according to the circumstances of each application.

⁽²⁾ British Columbia, Inquiry into Finfish Aquaculture in British Columbia, David Gillespie, Chairman, *Report and Recommendations*, 12 December 1986.

Committee agrees with the aquaculturists that the lead role for development should clearly be taken by the private sector, it also envisages new areas of inspection and regulation in the years ahead as the industry matures, to ensure that environmental values are preserved and to minimize conflicts with the conventional fishery. Preliminary investigations into aquaculture are currently being conducted in the Yukon,⁽¹⁾ and the Committee hopes that commercial developments in that area will proceed more rationally than they did in B.C.

The Committee therefore recommends:

- (13a) That federal, provincial and territorial governments fully coordinate their efforts to ensure the orderly and responsible development of aquaculture. Both levels of government should develop a clear policy towards aquaculture based on well-defined goals, careful planning and regulation, and public and industry consultation. The jurisdictional and regulatory framework for commercial aquaculture should be clarified.**

A strong federal responsibility for the aquaculture sector must be recognized, since the federal government has jurisdiction over many of its aspects, such as the regulation of fish habitats and fish disease control. The federal government also provides research support to the industry on a national basis. Much of the controversy over the biological effects of fish farms on the marine environment and on the health of wild fish stocks, and over the chemical effects of toxicants, hormones and antibiotics used by the industry, is due largely to the lack of comprehensive studies or data.

The Committee supports the many concerns which were voiced in the area and recommends:

- (13b) That the Department of Fisheries and Oceans undertake an assessment of the effects of aquaculture operations on the marine environment.**

H. Managing the Salmon Resource in Northern B.C. and the Yukon

The fisheries of the Yukon and northern B.C. are currently administered by the Department's Fraser River-Northern B.C.-Yukon Division, from Vancouver. Some witnesses stated that the Division concentrates most of its effort on B.C.'s larger coastal fisheries in the Fraser Valley area, which have very little relevance to the fisheries of the northern areas. The Committee agrees with the general view that these fisheries should be given a higher profile in the Department's organizational structure,⁽²⁾ and therefore recommends:

- (14) That the Department of Fisheries and Oceans reassess the position of the northern B.C. and Yukon fisheries within the Department's organization with a view to giving the area divisional status.**

I. Managing the Freshwater Fisheries in the Yukon

Under the authority of the Fraser River-Northern B.C.-Yukon Division, DFO not only manages salmonids in the Yukon, but also freshwater species, which include stocks

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 3, 14 November 1986, p. 42.

⁽²⁾ Pearse (1982), p. 249.

of steelhead trout, Arctic char, Dolly Varden, northern pike, turbot, rainbow trout, lake trout, whitefish and Arctic grayling. The freshwater resource supports both subsistence and sport fishermen. As well, commercial fishing of freshwater species takes place on some 20 Yukon lakes.

During its hearings, the Committee learned that the territorial government had been actively pressing to obtain a transfer of authority for managing its freshwater fishery.⁽¹⁾ Unanimous agreement, including that of native groups, was expressed on the transfer, on the grounds that the Territory's freshwater sector is something of an anomaly within the regional administration of DFO, whose effort is primarily directed to regulating commercial fishing in marine waters. The Committee was surprised to learn that the Department had committed less than one person-year to the freshwater sector in the Yukon.

Some lakes and streams in the Territory were believed to be subject to heavy fishing pressures, particularly from fly-in operators who concentrate on certain freshwater lake stocks. Little information exists, however, on fish stocks, although it is generally believed that these have been declining because of the Territory's lack of jurisdictional responsibility in the area of management. Although the federal government has agreed to a transfer, which was to have taken place on 1 April 1987, the question of providing financial resources to support freshwater management programs in the Territory has prevented this from happening.

The Committee agrees with a recent policy assessment that a priority of future freshwater fisheries management should be to obtain critical information on production and use of the resource.⁽²⁾ More enhancement of freshwater species should also be undertaken; at present, very little is being done.⁽³⁾ The Committee is convinced that a devolution of authority for freshwater fisheries management, as it exists at the provincial level elsewhere in Canada, will indeed result in a more responsive and effective management regime. It recommends:

- (15) That the transfer of authority for administering the freshwater fishery to the Yukon Territory proceed as planned. The federal government should also include sufficient budgetary support to ensure proper management and enhancement of the Territory's freshwater fish resource.**

EXPANDING THE RESOURCE BASE

A. The Salmonid Enhancement Program

The salmon stocks in the region, the basis of the fishing industry, have been estimated to be declining at an average rate of about 1.5%, with average harvests in recent years representing less than half the potential yield for the species.⁽⁴⁾ Understandably, unanimous agreement was expressed on the need to produce more fish with the assistance of enhancement techniques provided by the major and highly visible Salmonid Enhancement Program (SEP).

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 3, 14 November 1986, p. 11.

⁽²⁾ Howard Paish and Associates, *The Yukon Sport Fishery: Summary*, March 1981, p. 7.

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 3, 14 November 1986, p. 22.

⁽⁴⁾ Pearse (1982), p. 9, 283-88.

Initiated in May 1977 as a jointly funded federal-provincial program, the SEP's long-term objective was to double the catch of salmon and sea-run trout, so as to restore them to their historical levels of abundance.⁽¹⁾ It also sought to provide considerable social and economic benefits by pursuing five major goals: augmenting national and provincial income, creating employment opportunities, improving economic opportunities for natives, fostering development of economically disadvantaged communities and regions, and expanding recreational opportunities.⁽²⁾ To achieve these ends, culture facilities such as hatcheries, fishways and artificial spawning channels were built. Other techniques to improve the resource and its environment have included restoring freshwater habitat and fertilizing lakes. Originally planned for a five-year period, the initial phase of the SEP (Phase I) ran for seven years. Since 1984-85, the program has focused on improving existing facilities and fish habitats, in order to review the results obtained in Phase I. Total capital and operating costs over the first nine years of the program have amounted to over \$250 million.⁽³⁾ Implementation of the second phase of SEP was contingent upon the level of success obtained in Phase I.

In general, a number of outstanding achievements can be reported. For example, enhancement contributed about 14% by weight and 21% by landed value of the total salmon harvest in 1985. The Committee also learned that, because of the two to six-year life cycle of salmon, enhancement was just beginning to provide benefits; it was estimated that the maximum returns would not occur until about 1992 or 1993.⁽⁴⁾ Besides providing valuable support to DFO's biological effort, Phase I has created employment opportunities through Community Economic Development projects which might not have been otherwise available in the region. The SEP is also very successful at maintaining public participation through public involvement programs, advisory groups, information programs and school education, the benefits of which are not readily quantifiable but can nonetheless be easily observed. The Committee was particularly struck by the dedication shown by the many volunteer groups, made up of over 7,000 individuals, who devote long and hard hours to running small hatcheries and undertaking habitat conservation and rehabilitation activities.

Of particular concern to all groups and individuals was the lack of a firm federal government commitment to pursuing SEP, a commitment which would allow for enhancement planning. The Committee is sufficiently convinced that the SEP is a much needed and worthwhile investment in the future of the West Coast fishery, and was pleased to learn of the federal government's recent decision to reaffirm its commitment to SEP by providing \$208 million in funding over the next five years.⁽⁵⁾

Although all the various interests in the region expressed their high regard for SEP, this did not prevent some from suggesting modifications to the program. There was some concern that SEP-raised hatchery fish might adversely affect wild stocks when caught in a mixed fishery. Allowing the commercial fleet to harvest the full production of enhanced salmon stocks could eliminate wild stocks; limiting the harvest of enhanced fish, on the other hand, would require forgoing sizeable amounts of enhanced production.

⁽¹⁾ *Ibid.*, p. 48.

⁽²⁾ *Ibid.*

⁽³⁾ Auditor General, *Report*, 1986, para. 10.89.

⁽⁴⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 5, 18 November 1986, p. 25.

⁽⁵⁾ Department of Fisheries and Oceans, "Additional Funding Announced for the Salmonid Enhancement Program," *News Release*, (NR-PR-87-04E), 23 June 1987.

With respect to this biological conundrum faced by fisheries managers, it was suggested that DFO should give greater priority to natural and semi-natural enhancement techniques that promote wild salmon production, instead of directing more funds to artificial hatchery production. Smaller-scale rehabilitation projects, which lend themselves to public involvement, were also believed to increase the cost-effectiveness of salmon enhancement. Other activities, such as lake enrichment, are considered to be especially successful, by providing "about one-quarter of all SEP fish at a cost of about 5% of the budget."⁽¹⁾

In view of this, and mindful that the production of enhanced salmon is not a substitute for the sound management of wild fish stocks and habitats, the Committee recommends:

(16a) That the Department of Fisheries and Oceans give greater funding priority to those projects which promote the enhancement of wild stocks of salmon.

With respect to the enhancement of chinook and coho salmon, the preferred species of sport fishermen, the productivity of hatcheries has been lower than anticipated, for reasons not yet known. The Committee recognizes that enhancement of these species is particularly necessary to maintain the viability of the recreational fishery, and recommends:

(16b) That the Department of Fisheries and Oceans step up its research effort to solve the problems associated with coho and chinook salmon enhancement.

It should be noted that an agreement between Canada and the United States on the allocation of salmon stocks is necessary to justify the costs of further enhancing the salmon stocks of the Yukon River. Any future enhancement programs that Canada initiates on the Stikine and Taku Rivers in northern B.C. will, however, benefit Canadian fishermen under the Pacific Salmon Treaty. Giving higher priority to the enhancement of these rivers is important to ensure a viable Canadian fishery, given the small percentage of the salmon which it currently receives. The Committee recommends:

(16c) That funding be provided for the enhancement of the salmon stocks of the Stikine and Taku Rivers.

The Auditor General recently noted that in 1986 less than 10% of the total \$250 million in program costs had been recovered.⁽²⁾ Although they are generally opposed by commercial and sport fishermen,⁽³⁾ the Committee supports the recent increases in commercial and sportfishing licence fees to recover, in part, the costs of SEP. Other possible ways of recovering costs were also mentioned, such as revising the price and redirecting the funds received by DFO-run hatcheries for the sale of surplus eggs to fish farmers. Given that the original objective of SEP was that program costs would be eventually recovered from the fishing interests which benefit most from enhancement, the Committee recommends:

(16d) That the Department of Fisheries and Oceans seek other forms of cost recovery which could help widen the funding base for the Salmonid Enhancement Program.

⁽¹⁾ Auditor General, *Report*, 1986, para. 10.92.

⁽²⁾ *Ibid.*, para. 10.97.

⁽³⁾ Sport fishing licence fees were increased to bring them up to par with provincial fees. Commercial fees were doubled.

In the longer term, however, new institutional and financial arrangements are needed to make fuller use of the opportunities afforded by enhancement, and to ensure that those who benefit from the activity bear a fair share of the costs. For example, the benefits of enhancement could be greatly increased if the fishing capacity of the fleet were reduced. A user-pay system based on landings charges and which required fishermen to pay (e.g., a fee per pound of fish landed) into a species-specific fund earmarked for enhancement could also be implemented. Many witnesses expressed keen interest in the private non-profit hatchery program for enhancing salmon, which is currently operating in the State of Alaska, as described below.

B. The Alaska Model for Enhancement

In response to a slow but steady decline in commercial salmon harvests, from historical levels of 100 million salmon to 25 million in the early 1970s, the State of Alaska first imposed limited entry programs in five fishing regions to curb the growth of the commercial fishing fleet. In 1974, the state legislature introduced what is commonly known as the *Private Non-Profit Hatcheries Act* which authorized the creation of non-profit corporations, and in subsequent years, established the *Fisheries Enhancement Loan Program* which provided private organizations with long-term, low-interest loans for hatchery planning, construction and operations. Regional fishery associations were also created, comprising commercial, sport and subsistence fishermen, and interested members of local communities, to develop salmon production plans and projects necessary to restore the salmon stocks.

The following are some of the more noteworthy features of Alaska's approach to enhancement. First, commercial fishermen are limited to harvesting fish in their own regions⁽¹⁾ and therefore have much interest in increasing the production of salmon there. As elected members of boards of directors of regional enhancement associations, they imposed on themselves voluntary or mandatory salmon tax assessments of 2% or 3% on landings. These fees, which are collected at canneries and cold storage plants, are later returned to the Private Non-Profit (PNP) hatcheries. Second, revenues for PNP facilities are supplemented from the sale of fish which make it through the fishery and return to the special harvest areas near PNP hatcheries. Hatchery operators are permitted to take enough fish to recover their costs. Third, PNP hatcheries are located in isolated coastal bays; terminal fishing therefore occurs only after enhanced stocks have separated from natural stocks.⁽²⁾

To date, seven regional associations have been formed, four of which collect tax assessments.⁽³⁾ As shown in Table 28, cumulative state loans borrowed by PNP corporations for capital construction and operations amounted to over \$50 million (U.S.) in 1986. Over \$17 million (U.S.) was generated through tax assessments and special harvest area sales. An estimated 7.9 million adult salmon originally released as juveniles from PNP facilities were either harvested by the traditional common-property fishery or returned to the special harvest areas in 1986.⁽⁴⁾ By comparison, program costs of SEP in Canada totalled some \$250 million, producing about 8.6 million fish in 1985,

⁽¹⁾ Licence limitations in B.C. have been implemented on a coastwide basis though fishing fleet movement has not been restricted.

⁽²⁾ In contrast, many enhancement facilities in B.C. have been built along major salmon tributaries, causing excessive mixing of wild and enhanced stocks.

⁽³⁾ Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development (FRED), "FRED 1986 Annual Report to the Alaska State Legislature," *FRED Reports*, No. 70, January 1987, p. 53.

⁽⁴⁾ *Ibid.*, p. 65.

with an estimated catch of some 4.7 million pieces.⁽¹⁾ These figures, however, may not be directly comparable because of differences between Canada and Alaska in species mix and fish habitat.

TABLE 28

**CUMULATIVE STATE OF ALASKA LOANS AND ENHANCEMENT FUNDS
RETURNED TO ASSOCIATIONS' AND ANNUAL FISH SALES FOR 18 PRIVATE
NON-PROFIT HATCHERIES², 1986**

Loans, Funds and Sales	Amounts (\$ '000s U.S.)
State Loans	
for capital construction	40,886.9
for operations	10,642.5
Cumulative enhancement funds generated through assessments, returned to associations via contract	15,633.7
Estimated revenue from 1986 sales of fish returning to special harvest areas	1,867.0

¹ 30 June 1986.

² 31 December 1986.

Source: FRED 1986 Annual Report, *FRED Reports*, Table 6, p. 57.

The Committee is also aware that the Alaskan approach involves the concept of exclusive rights to fish, which has not yet been approved in the region,⁽²⁾ and restricts fishermen to particular fishing areas. According to what the Committee has seen, however, the Alaska model for enhancing salmon stocks appears to be viable and worthy of further study; not only does it offer the opportunity to tap private initiative, it also implies that those who benefit from enhancement should pay for it.

The Committee therefore recommends:

- (17) That the Department of Fisheries and Oceans and industry determine the feasibility of introducing private non-profit hatcheries into the region.**

DEVELOPING MARKETS

A. The Role of Government in Marketing

The Committee agrees with the general view that the private sector is fully capable of marketing its fishery products, and that it can best provide the flexibility needed to respond to forces in the market place. In response to the anxieties which witnesses

⁽¹⁾ Department of Fisheries and Oceans, *SEP Update 1985*, 1986, p. 16.

⁽²⁾ Neil Bourne and J. Roly Brett, "Aquaculture in British Columbia," *Proceedings of the National Aquaculture Conference*, G.I. Pritchard, ed., Canadian Special Publication of Fisheries and Aquatic Sciences 75, Department of Fisheries and Oceans, and the Science Council of Canada, Ottawa, 1984, p. 36.

expressed about marketing boards and other potential forms of direct government involvement in marketing, the Committee specifically recommends:

(18) That government not be directly involved in marketing the fishery products of the West Coast.

It must, however, be recognized that the government has an important role in assisting the industry by cost-sharing selected market research studies, providing continuing marketing intelligence and advice, linking foreign buyers with domestic producers,⁽¹⁾ inspecting fish products to ensure they conform to quality standards, injecting marketing considerations into fisheries management to improve the returns of the resource, and promoting awareness, knowledge and use of Canadian seafood.

B. Markets for Fresh Fish

To meet the growing demand for fresh fish in Canada, the United States and other international markets, the Committee re-emphasizes the need to reduce overcapacity in the fishing fleet, which tends to shorten the fishing season and result in concentrated deliveries of fish which must be rapidly processed by either freezing or canning. It also unduly increases the costs of bringing products to market. A smaller fleet, on the other hand, would reduce fishing pressure on the resource, extend the fishing season, help control the flow of fish into plants, and enable producers to supply fresh fish markets over longer periods.⁽²⁾

Given that market trends are towards fresh fish, the Committee recommends:

(19a) That future programs for fisheries management on the West Coast take into account the opportunities inherent in providing fresh fish to markets.

At present, very little evidence exists to suggest excessive competition between B.C. wild and farmed salmon in fresh fish markets. It can also be argued that chinook and coho salmon, the two species farmed, represent only a small percentage of the commercial fishery's total salmon take, and that fresh farmed salmon would be processed and sold during the commercial fishery's off-season. This would reduce the seasonal nature of employment in fish processing, make use of idle facilities and transportation networks, and create a more consistent year-round supply of West Coast products to markets, which could, in turn, serve to stimulate overall demand.

It should, however, be pointed out that B.C. salmon farmers expect to market most of their future production in the United States, especially in the highly populated and affluent centres of the West Coast.⁽³⁾ While it is generally assumed that American demand for fresh salmon will continue to grow, production increases in B.C. will coincide with larger and growing supplies of pen-reared salmon from a number of other countries. This should concern B.C. producers, since it is not clear when market saturation will be reached. The industry should heed as an early warning reports that Norwegian producers in 1986 were not able to market all of their fresh fish production in Europe and had to freeze part of it.

⁽¹⁾ Including East Bloc countries and those receiving development assistance through the Canadian International Development Agency (CIDA).

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 42.

⁽³⁾ It was estimated that by 1990, 50% or more of consumption would be in the United States because of the large size of that country's market, its proximity and ease of access.

In sum, there is a need for a more comprehensive market strategy for fresh B.C. farmed salmon. The B.C. Salmon Farmers' Association, which represents nearly 95% of all active salmon farmers in B.C., informed the Committee that it had commissioned a \$50,000 study, with the support of the federal and provincial governments, as a preliminary step toward developing such an industry strategy. In addition to collecting membership fees and special levies on product sales by member farmers, the Association stated that it would be seeking matching funds from government to help pay for new marketing program initiatives.

Government support should be provided in the initial stages of the industry's development to help identify and analyze market opportunities, and to contribute to a strategy aimed at developing brand image, given that competition will intensify in the future, and that some foreign producers, such as the Norwegians, have already established market acceptance for their products.

The Committee therefore recommends:

- (19b) That the relevant federal and provincial government agencies support cost-sharing market research studies to assist the salmon farming industry in developing promotional and market development programs.**
- (19c) That market research be conducted to determine the size and potential of markets for farmed salmon. Research should also be undertaken of consumer comparisons of B.C. farmed salmon and salmon from competing producers (e.g., chinook and coho salmon and Atlantic salmon).**

The Committee also notes the anxiety that fish farming has caused commercial fishermen on the West Coast, and recommends:

- (19d) That government encourage the processing and marketing of B.C. farmed salmon to be complementary to that of the traditional fishery.**

C. The Domestic Market

It should be noted that the Committee's inquiries have revealed that there has been no comprehensive analysis of the Canadian market for fish and seafood products, and that there is little general information, except for statistics on fish landings, production and trade, to assist the Canadian seafood industry in developing future marketing programs in Canada.

In view of this, the Committee recommends:

- (20a) That government commission or undertake a comprehensive study of the size, nature and potential of the Canadian fish and seafood market. The study should include an analysis of per capita seafood consumption in terms of edible and round weight equivalents by species, product form and country of origin.**

Even without this information, it would appear that opportunities yet to be exploited domestically should be of interest to the West Coast industry, particularly in supplying fresh fish to central and eastern Canada. Although the domestic market is the largest single market for the industry's total production, B.C. fish processors should

be concerned that they are still so highly dependent on exports, as processors have very little control over factors such as exchange rates, tariffs and import quotas.

Canada imported roughly \$616 million worth of fish products in 1986, in part to supply the retail and food service sectors with fresh fish year-round. Despite opportunities made possible with the introduction of air freight, it would appear that, because of the export and local orientation of its marketing patterns, the industry has been undersupplying markets in the rest of Canada. It was also brought to the Committee's attention that there may be certain promising domestic market segments not being pursued by small producers because of the high costs associated with market research and development.⁽¹⁾

The salmon farming industry may be neglecting the domestic market as well. For example, one salmon farm in Washington State reported sales of about 16 tonnes to B.C. in 1983 and 1984.⁽²⁾ Salmon farmers should note that consumer acceptance of farmed salmon in eastern Canada is believed to be good, despite high prices. In short, the domestic market offers promising opportunities, given the acute shortages of fresh fish and the relatively small amounts of Norwegian salmon now entering the eastern Canadian market.

To assist in developing domestic sales of West Coast fish and seafood products, the Committee recommends:

- (20b) That government encourage West Coast seafood producers to work cooperatively toward creating an effective distribution system for the Canadian domestic market.**
- (20c) That government support any industry attempts to mount a national trade show to introduce West Coast fish processors to retailers and food service operators from other regions of Canada.**

Since DFO's Marketing Directorate was disbanded in early 1986, the federal government has ceased to be directly involved in generic seafood promotions. There is little doubt, however, that Canadian seafood needs more such promotion domestically. Generic promotions are especially important in preventing the consumer from switching to substitute products if prices continue to escalate as they have in recent years. The Canadian seafood industry should be aware that consumers in Canada, while generally informed about the nutritional and healthful attributes of seafoods,⁽³⁾ are poorly informed about their ease of preparation and value for money when compared with boneless cuts of meat.

A number of methods of promoting the consumption of fish and seafood in Canada were mentioned by various witnesses from the food service and retail sectors. These included: publishing more educational information on the nutritional benefits of eating seafood, on the characteristics of high quality fish, and on the preparation of fish, especially fresh fish. It would appear that very few Canadians are aware that the preparation of fish and seafood is simple and convenient and, when a microwave oven is used, can be faster than preparing fast foods.

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 4, 17 November 1986, p. 42.

⁽²⁾ British Columbia, Ministry of Agriculture and Fisheries, *The Market for Farmed Salmon: An Overview*, 1986, p. 20.

⁽³⁾ Department of Fisheries and Oceans, *Inspection Process Survey #1464*, January 1986, p. 43.

Many witnesses also believed that consumer advertising or promotional programs should be emphasized throughout the year, not just during Fish and Seafood Month in November, a time when frozen and imported products are almost the only fish products available.⁽¹⁾

As well, the importance of the ethnic consumers in the Canadian market was mentioned; these consumers may be "opinion leaders" in that many have shown an interest in introducing fish and seafood to other Canadians. It was also suggested that school educational programs be introduced, starting in the elementary schools and continuing through high school, especially in the field of home economics.

While generic advertising is now managed by the industry, the federal government assists with transitional funding on a shared-cost basis. Contributions of \$400,000 were made during 1986-87 to the Seafood Advisory Council, which represents the major East Coast processors and the Freshwater Fish Marketing Corporation, and \$275,000 to the FCBC. Since government contributions are expected to be lower in the future, the private sector will have to assume greater funding responsibility if the Canadian fishing industry (including the Pacific fishery) is to reap the harvests of generic promotions. The industry may need to look at various means of self-assessment, such as introducing a special sales levy on each kilogram of product sold, to finance future generic advertising.

While the Committee intends to make more detailed recommendations in its final report, it now recommends:

- (20d) That government enlist the wider support of the West Coast fishing industry in funding generic promotion of the region's fish products in Canada. Future promotions should include new species and products.**

It should be noted that all of Canada would greatly benefit if more emphasis were placed on educating the consumer: consumers' health would benefit from a diet of more fish and seafood, retailers and wholesalers would experience increased demand, and fishermen and processors would have more domestic sales and outlets for their products.

D. Export Markets

In the past some confusion arose in the industry about the roles of DFO and the Department of External Affairs (DEA), since they collaborate very closely on some fisheries-related projects. Since 1983, the Agriculture, Fish and Food Products Bureau of DEA has been the lead agency which assists Canadian fish exporters. DFO, on the other hand, is primarily a resource department, emphasizing international analysis supportive of resource management practices.

Under its Program for Export Market Development (PEMD), DEA provides financial assistance to Canadian exporters to identify markets, participate in trade fairs, establish consortia, and sustain export market development. This is done on a shared cost basis, with funds generally repayable from resulting sales. The Department also participates in a number of international food trade shows that either specialize in or highlight fish products, such as SIAL in Paris, ANUGA in Cologne, Foodex in Tokyo, and the Boston Seafood Show, which members of the Committee visited in

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 13, 27 January 1987, p. 10.

March 1987. Other activities have included publishing a highly successful Canadian fish exporters' directory, sponsoring retail food promotions in Japan, commissioning market studies, conducting seminars with industry, providing fish trade reports, and undertaking industry tours to initiate contacts with firms with which the Department does not regularly work.⁽¹⁾

Although market prospects in the United States and in other parts of the world seem generally promising, the West Coast industry should consider expanding sales to other countries, such as West Germany, Japan, and Hong Kong, that have high per capita incomes and long histories of fish consumption. Opportunities may be particularly good in northern Europe because of the local pollution concerns there. The strength of aggressive and professionally planned and executed programs by many foreign producers who are aiming at the American seafood market also necessitates that effort be expended to diversify markets. Efforts should also be made toward finding alternative markets for B.C. herring roe products to promote employment stability, particularly in resource-dependent communities.

To increase and improve the flow of international market information to Canadian exporters, the Committee recommends:

- (21a) That the Department of External Affairs assume the responsibility for continuously updating the worldwide market studies previously undertaken by the Department of Fisheries and Oceans, in order to assist industry in formulating export marketing plans. An analysis of how the Canadian industry compares with its major competitors should be incorporated.**
- (21b) That the Department of External Affairs determine the long-term prospects of the herring roe market in Japan. The Department should also determine whether other suitable markets exist.**

Many West Coast fish processors obtain their customers at various international food trade shows. Some witnesses stated that Canada's presence at these was perhaps not as well-organized or coordinated as that of other countries, such as Norway.⁽²⁾

Under PEMD, the FCBC was given a \$206,000 grant for the period 1986 to 1988 to produce multilingual promotional brochures and booklets for distribution at trade shows. Since government funding for this purpose is not made available unless the industry raises counterpart funds, the suggestion that Canadian fish exporters should pay a special sales levy on exports, in order to finance generic promotions should be seriously considered.

The Committee believes generic foreign promotions aimed at seizing export market opportunities are important in persuading foreign buyers to think of Canada as a supplier of top-quality seafood products, and recommends:

- (21c) That the Department of External Affairs work toward expanding Canadian industry participation at international trade shows. A more unified Canadian presence should be sought where government funding is involved.**

⁽¹⁾ *Ibid.*, Issue No. 2, 7 November 1986, p. 49.

⁽²⁾ *Ibid.*, Issue No. 8, 21 November 1986, p. 10.

- (21d) That government enlist the wider support of the West Coast fishing industry in funding generic programs to promote the region's fishery products in foreign markets. Future promotions should include new species and products.
- (21e) That the Department of External Affairs, in cooperation with other federal and provincial government departments, increase its contacts with fish processors on the West Coast.

E. Trade Issues

Tariff and non-tariff barriers currently pose marketing problems for the West Coast fishing industry. One example is the 12% tariff on processed herring roe imposed by Japan.⁽¹⁾ In Australia, import regulations on fresh and frozen salmon imports effectively prohibit Canadian sales to that market. (The Australian rationale is that this trade restriction prevents the spread of salmonid diseases to their trout farms.)

The Committee learned that the EEC, after the recent expansion of its membership, was in the process of re-writing its tariff schedule, and that a system of tariff rate quotas for fresh, frozen and canned salmon was being considered. It was unclear whether Canadian salmon would draw the higher "frozen meat" tariff. Member countries of the EEC may also, in the future, attempt to use tariff concessions to obtain larger fishing allocations in Canadian waters, particularly on the East Coast. The federal government's policy in this regard has thus far been to separate trade issues from fish allocations.⁽²⁾ It should also be noted that countries such as Norway and Iceland were said to benefit from preferred access to the EEC's markets.

In short, trade protectionism occurs in current export markets and it can assume many forms. The Committee recommends:

- (22a) That the federal government continue to pursue its policy of separating tariff issues from issues concerning allocations of fish to foreign countries.

To widen trade opportunities and expand markets for the Pacific fishing industry, the Committee recommends:

- (22b) That the federal government, in the forthcoming multilateral trade negotiations under the General Agreement on Tariffs and Trade, seek to improve the trading conditions for the region's fishery products in such important markets as the EEC, Australia and Japan.

Canada's bilateral fisheries relationship with the United States was also the subject of much discussion. The FCBC estimated that in 1986 one-third of the groundfish harvest, excluding hake, had been landed for processing at American ports, where higher prices prevail than at Canadian ports.⁽³⁾

In the north, fish processors in Prince Rupert have been importing whole fish from Alaska, mainly pink salmon and herring, and processing it in Canada. In the spring of 1986, Alaskan fish processors filed a trade complaint in the form of a petition against

⁽¹⁾ *Ibid.*, Issue No. 9, 24 November 1986, p. 28.

⁽²⁾ *Ibid.*

⁽³⁾ *Ibid.*, p. 22.

Canada under the provisions of section 301 of the United States *Trade Act*. The petition alleges that Canadian federal regulations which prevent B.C. fishermen from selling unprocessed sockeye and pink salmon and herring to American processors, amount to unfair practices in trade. The *Trade Act* empowers the United States President to impose offsetting trade sanctions. Of concern to the Fisheries Council of Canada were the possible adverse effects American trade "offsets" might have on Atlantic seafood trade flows.⁽¹⁾ Although many representatives of the fishing industry believed the issue could be settled by having the United States adopt regulations similar to those of Canada, and by having both countries adopt a policy allowing for the export of excess fish,⁽²⁾ the Americans have since launched legal proceedings against Canada under the General Agreement on Tariffs and Trade (GATT).

The Canadian government's rationale for having export restrictions on unprocessed salmon and herring is to recover some of the costs incurred by Canada in managing these stocks and their habitats.⁽³⁾

The Committee supports the federal government's stand on the issue, and recommends:

- (22c) That the federal government vigorously defend in bilateral and multilateral forums, Canada's right to have its fish resources processed in Canada. The Canadian government should also make clear its position during current trade discussions with the United States as these relate to the fisheries.**

The Committee also learned the International Fund for Animal Welfare (IFAW) had sponsored a correspondence campaign in the United States, asking consumers to boycott Canadian seafood products if further steps were taken to control the seal population in the East Coast. The Committee points out that seals and other marine mammals are not only direct competitors for fish resources on both coasts of Canada, they are also believed to be responsible for the problem of parasite infestation in groundfish.

The IFAW campaign was reported to be directed against B.C. canned salmon, an easy target for a boycott, because the label clearly identifies it as a product of Canada. Earlier IFAW campaigns in Europe were believed to have succeeded to the extent that at least one major supermarket chain in the United Kingdom had removed Canadian canned salmon from its store shelves.⁽⁴⁾

Given that the federal government's response to a previous boycott was criticized by some as being poorly planned, the Committee recommends:

- (22d) That government and industry consider jointly planning and funding a public relations campaign aimed at countering any future boycott of Canada's fishery products abroad resulting from the seal management issue.**

⁽¹⁾ *Ibid.*, Issue No. 1, 4 November 1986, p. 10.

⁽²⁾ Canadian plants in the past processed part of the Alaska harvest because there was insufficient processing capacity in that state.

⁽³⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 2, 7 November 1986, p. 65.

⁽⁴⁾ *Ibid.*, Issue No. 9, 24 November 1986, p. 24.

F. The Sport Fishery

The sport fishery should also be perceived as part of the West Coast fishing industry. As such, the marketing of fish and fishery products should not just entail a conventional commercial orientation to the resource; it should include sport fishing, which can be developed and marketed as a "product" much like tourism. Moreover, market research in the United States is said to indicate that recreational fishermen are "among the most knowledgeable and confident fish and seafood users," and that they can be considered to be opinion leaders "who help generate future seafood consumption."⁽¹⁾

The United States market in particular, with its 42 million anglers, would appear to offer enormous potential if approached intelligently. One witness stated that:

Although 3% of American anglers fished in other countries including Canada in 1985, it is estimated that fewer than 0.15% of them fished in B.C., and about half of these anglers purchased only one-day licences, likely for a day's fishing near Vancouver.⁽²⁾

Although the sport fishing industry should itself be responsible for acquiring a better understanding of its markets, government should assist in promotions. Several witnesses, however, mentioned both the federal and provincial governments' apparent lack of understanding of how to market this fishing activity on the West Coast. Cited were the short-term area closures in 1985. These were imposed to conserve the chinook salmon, but anglers in the United States were led to believe that the entire fishery had been closed.⁽³⁾

In view of the above, the Committee recommends:

- (23) That the sport fishing industry and government jointly begin to formulate a national strategy to better promote the sport fishery in Canadian government embassies, consulates and tourism offices throughout the world.**

West Coast sport fishing opportunities are different from those on the East Coast and in the central and northern freshwater region, as well as being different within these three regions; the Committee stresses the importance of recognizing this diversity and the unique characteristics of each fishery in future promotions.

EXPANDING THE PRODUCT FORM MIX

A. Salmon

Stabilization of the salmon supply through enhancement should encourage the West Coast fishing industry to develop new products that would bring about deeper market penetration. In terms of product form, there are essentially three categories for salmon: fresh/frozen, canned and smoked. The fresh/frozen category is by far the fastest growing, not only for salmon but for most seafood. Growth in fresh fish sales has

⁽¹⁾ Impact Marketing USA Inc., "The U.S. Seafood Scene," Speech to Fisheries Council of Canada, September 1986.

⁽²⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 5, 18 November 1986, (Appendix), p. 4.

⁽³⁾ *Ibid.*, p. 8.

been particularly rapid since improvements in handling, transportation and storage have enabled the industry to deliver greatly improved quality to consumers. Product forms such as shatterpack fillets and skinless/boneless blocks are other innovations that are gaining market acceptance.

The domestic market will likely continue to be the principal market for West Coast canned salmon. Over the last decade, approximately 55% of B.C. canned salmon production has been absorbed by this market. Although Canadian consumption of canned salmon tends to fluctuate with production, over the years it has remained relatively stable. While this suggests that the Canadian market has limited potential for growth, it may be worthwhile for West Coast producers to re-examine their marketing strategy for this important market. An updated review of Canadian consumer attitudes towards canned salmon should be undertaken to improve existing canned salmon packs or to develop entirely new ones. For example, a number of witnesses mentioned the development of can packs of skinless/boneless pink salmon in the United States.

A most serious impediment to the marketing of B.C. canned salmon is that production costs are higher in Canada than in the United States. Even with the current "Most Favoured Nation" tariff of 3% on canned salmon (not in oil), imports are able to compete successfully with the domestically-produced product. In view of this, the West Coast industry should divert more pink salmon processing to frozen product forms such as skin-on fillets in 15-pound shatterpacks which could be slacked out and repacked by retailers. Yields from pink salmon and other species could also be increased by using the tails for fish and chips and by recovering flesh from the heads for producing patties.

Processors of higher-valued fish species are generally putting more emphasis on portion control in supplying good value to their customers.⁽¹⁾ One American West Coast company is selling two four-ounce portions for 20% less than an 8-ounce portion. These four-ounce portions are produced from the smaller ends of fish which steakers find difficult to make use of. A Toronto fish and chips operator who appeared before the Committee has been using salmon tails, which he cuts, skins, cooks and features as a popular item on his menu.

With respect to fish farmed salmon, proximity to the fast growing fresh salmon market in the United States and its projected increase from 12,000 tonnes in 1986 to 50,000 tonnes in 1990, should be ample incentive for the salmon farming industry. As the production of B.C. farmed salmon increases, however, the industry would be well advised to develop innovative product forms like those being developed for wild-caught salmon.

In upscale markets, smoked salmon offers promising possibilities and the industry could expand the consumer base by developing lower-priced smoked salmon packs as well as choice cuts or premium-priced packs.

B. Pacific Herring

The major processors in B.C. have shown very little interest, if any, in exploring markets for herring roe other than Japan. The FCBC informed the Committee that the most profitable use of Pacific herring is the production of roe but that after the roe is

⁽¹⁾ "New Products," *Seafood Business*, Vol. 5, No. 6, November-December 1986, p. 73.

extracted, the herring carcass is considered virtually useless.⁽¹⁾ The FCBC did, however, mention that the aquaculture industry is beginning to use herring carcasses as feed for farmed salmon. This would indicate some residual nutritional value in what was previously perceived as worthless. In fact, a number of witnesses from the harvesting and processing sectors expressed the need to explore ways to produce food from herring carcasses. The Committee therefore recommends:

- (24) That government and industry vigorously undertake a comprehensive research and development program designed to utilize Pacific herring more fully for human consumption and industrial use.**

C. Groundfish

The demand for fresh fish, particularly groundfish, is expected to remain strong. The industry should take the opportunity to improve returns by introducing into existing markets individual portion packs of fresh Pacific groundfish.

Perhaps the most promising opportunity is the development of under-harvested species such as Pacific hake, pollock, and dogfish. One witness who appeared before the Committee in Nanaimo has had some success, on a limited test basis, in producing surimi from hake.⁽²⁾ The same witness also expected to produce salted hake for the Portuguese market. Besides making excellent fish and chips, if processed properly, dogfish, a very popular species in England, can also be used as raw material for surimi.

The number of surimi producers is growing and demand for this intermediate fishery product, used in making simulated crab, shrimp and scallops, is increasing rapidly. Most of the surimi used in North America is made from Alaska pollock by Japanese or Korean processors. However, during their visit to the Boston Seafood Show, Committee members tasted surimi crab made from cod by a Newfoundland company. Interestingly, the fish used by this company were small cod unsuitable for processing into traditional product forms.

In view of the rapidly expanding demand for surimi products and the apparent suitability of underharvested groundfish species on the West Coast for surimi processing, the Committee recommends:

- (25) That research and development be directed and funded jointly by government and industry with the ultimate goal of commercially producing surimi from Pacific hake, pollock and dogfish.**

D. Invertebrates

Industry should direct more effort towards developing new product forms from the 26 species of invertebrates available on the West Coast. The Pacific Biological Station in Nanaimo has achieved remarkable success in culturing various species of shellfish, notably scallops, and the Committee recommends:

- (26) That the transfer to industry of new aquaculture technology, particularly that relating to high-value shellfish, be effected as quickly as possible.**

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 9, 24 November 1986, p. 34.

⁽²⁾ *Ibid.*, Issue No. 7, 20 November 1986, p. 11.

MAINTAINING AND ENHANCING PRODUCT QUALITY

A. Background

Changes in consumer tastes and eating patterns increasingly lead to a demand for higher quality fish products. Often emphasized was the West Coast industry's hard-earned reputation for products of consistently high quality. Canadian Pacific salmon, in particular, was said to have gained a preferred place in both domestic and foreign markets.

While this may be true, the industry should not become complacent and neglect to seek further ways to improve fishing methods, fish handling techniques, processing and marketing practices, simply because its reputation seems secure or because current market prices are high. That present reputation must be maintained if West Coast producers are to meet the dictates of world markets in the face of stiffening competition. An emphasis on producing high-quality products and obtaining the resulting higher prices, especially for salmon, makes good marketing sense, given the probable cost advantages enjoyed by Alaska processors from their consistently larger volumes of production, and the competition likely from Norwegian producers. In addition, because salmon and herring are currently being harvested at maximum sustainable yield,⁽¹⁾ an emphasis on quality is also a good way of increasing the socio-economic returns of the resource.

B. The Role of Government

The West Coast's reputation for high quality fish is due, in large part, to DFO's inspection services, which have primary responsibility for maintaining standards. The Department derives much of its legal authority from the *Fish Inspection Act*.⁽²⁾ Federal inspectors also enforce provincial fish inspection legislation in B.C. This legislative base gives DFO the mandate to inspect all fish exports and imports, fish and fishery products traded interprovincially, and most fish and fish products traded intraprovincially.

Quality guidelines are set by the Department, in consultation with industry, and fishery products are inspected against these guidelines. Inspections involve sensory testing for colour, odour, texture, flavour or appearance, or more objective procedures such as chemical or microbiological examination. For canned fish, botulism is the main concern; current Canadian practices have undoubtedly ensured the maintenance of standards higher than those of other producing nations, such as the United States, where, in the past, this problem has occurred.

Although processing plants in B.C. are licensed by the province, since most export some of their product they require federal certification. These are inspected by DFO to ensure they meet the necessary standards of construction, operation, sanitation and hygiene. As well, fishing vessels, holding systems, and unloading, handling and transportation facilities must meet specified standards.

Fish imports are also rigorously inspected for quality and safety; any whose producers show a poor history of compliance are identified on a Mandatory Inspection List (MIL). It is noteworthy that a cost-recovery scheme has been implemented for the

⁽¹⁾ *Ibid.*, Issue No. 8, 21 November 1986, p. 18.

⁽²⁾ The Department also enforces the *Sanitary Control of Shellfish Fisheries Regulations*, the relevant sections of the *Food and Drug Regulations*, and the *Consumer Packaging and Labelling Regulations* as they apply to fish and fishery products.

inspection of fish product imports; this involves annual licence fees for all importers and other charges, such as those for testing products on the MIL.

C. Terminal Fisheries

Management decisions on where salmon are to be caught have important implications for product quality. DFO was said to have recently moved toward a terminal fisheries strategy, in which returning salmon are harvested close to or in their rivers of origin, instead of further out at sea. Support for terminal fishing generally rests on the grounds that it allows for more selective management and harvesting of stocks. This in turn facilitates stock rebuilding and allows more aggressive enhancement as well as improving the economy of fishing by reducing the costs of harvesting and transporting fish to processing plants. It also tends to limit the catch to mature fish, thereby increasing production. Terminal fisheries, where fish are caught inland, are also a part of native claims for the return of their historical fishing rights.

The advantages of terminal fishing may, however, be offset by the reduced value of landings. Since the quality of salmon progressively deteriorates as the fish approach their spawning streams, terminal fishing may limit the production mix to canned, smoked or roe products. This is especially true for chum salmon, which are widely considered to be the poorest quality salmon when caught in freshwater.

During the Committee's hearings, it was suggested that more experimental "test" fishing should be done by DFO outside terminal areas, so that fishermen would be able to harvest fish in prime physiological condition.⁽¹⁾ While test fishing out at sea is feasible, it appears that the funding required to charter vessels is a major problem.

Fish handling techniques can, however, improve salmon quality. The Committee learned of an upriver experimental fishery operated by the Chehalis band from the Fraser River area, involving the harvest of enhanced chum salmon considered in excess of spawning needs.⁽²⁾ The fishery is regarded by the band as being successful; last year, its salmon products were sold in roe and smoked forms in the United States. The method of harvest used, lifting the fish by hand after having herded it into shallow waters with a seine net, is believed to result in fish of better landed quality than those which struggle and are crushed in the holds of fishing boats for long periods.

Terminal fisheries have important implications for fish quality. The Committee recommends:

- (27) That the Department of Fisheries and Oceans move carefully in introducing more terminal fishing. The Department should determine the possible impact of changes in product quality and mix which might result from such fishing.**

D. Handling Fish at Sea

Regardless of where salmon are harvested, handling practices on vessels at the time of capture are important in determining the overall level of fish quality. Because of

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 4, 17 November 1986, p. 81.

⁽²⁾ When enhanced salmon runs are intermixed with wild stocks, large surpluses of enhanced fish must often be allowed through to the spawning beds. Here, they are not only surplus to spawning needs, but may also do serious damage to fish habitat.

bruising, net-caught salmon have widely been held to be of inferior quality to troll-caught fish. This is because net fishermen often catch more sexually mature salmon, which have soft flesh, and also because they generally handle larger volumes of fish than trollers, who are able to handle fish individually. Over the years, however, improved on-board handling techniques and the installation of refrigeration and chilled seawater systems have perhaps blurred the distinction between the harvests of different commercial gear types.

Bruising is of little significance if salmon is canned, but for the high-quality fresh and frozen fish markets there is a need to improve fish handling techniques at sea. The Committee therefore recommends:

- (28) That the Department of Fisheries and Oceans encourage West Coast fishermen to improve fish handling techniques, such as cutting, bleeding, washing and refrigerating, at sea.**

E. Quality Grading

The provision of incentives for high quality fish landings needs to be investigated. It appears that current pricing arrangements, whereby pre-season prices are determined for net-caught salmon may not provide an incentive to land higher quality fish. The Pearse Report suggested that a system for grading all species of fish and fixing prices accordingly would provide such incentive.⁽¹⁾

The Committee notes that the establishment of such a price system merits further investigation, and recommends:

- (29) That government, with the assistance of the fishing industry, determine the feasibility of establishing a system of dockside quality grades with price differentials, on a species-by-species basis.**

DFO inspects all fish products and certifies their quality. This government certification was widely regarded by industry as being essential for it to access high quality markets. It has undoubtedly provided fish processors in the region with a competitive advantage over other fish-producing countries, in terms of image and marketability, in both foreign and domestic markets. A system for grading all end products should, however, be investigated. A recent consumer survey indicated that most respondents (90%) strongly believed that, in addition to inspecting fish, the government should also set up a system of "different grades for fish products to express the quality of the product."⁽²⁾ As well, most (70%) felt that a government seal, as opposed to a company seal, would make products much more likely to be sold.⁽³⁾ Quality grades would perhaps be especially useful for individual buyers or small restaurant operators who might not have the expertise to discern quality variations. The Committee therefore recommends:

- (30a) That the Department of Fisheries and Oceans, in cooperation with the fishing industry, assess the feasibility of establishing a voluntary quality grading and labelling scheme for the region's fish products.**

⁽¹⁾ Pearse (1982), p. 167.

⁽²⁾ Department of Fisheries and Oceans, *Inspection Process Survey*, #1464, January 1986, p. 38.

⁽³⁾ *Ibid.*, p. 35.

Some considered too stringent federal regulations forbidding the export of frozen sockeye and pink salmon with water marks covering more than 50% of the exterior or with net marks that have indented, softened, or perforated any part of the skin. Some claimed that these restrictions, which are believed to lose income and export market opportunities, exist to protect the canning industry.⁽¹⁾ The Pearse Report noted that exporting only the best product "should not become a policy objective" in itself, since this might prevent other countries from purchasing anything but the best quality product.⁽²⁾ Rather, the aim should be to "assure buyers of the quality of the products they bargain for," and "not to prevent them from buying the full range of products produced."⁽³⁾

The Committee agrees with this assessment, and recommends:

(30b) That the Department of Fisheries and Oceans consider replacing current export restrictions on frozen sockeye and pink salmon, with a system of quality grades.

F. Transporting Fresh Fish to Markets

Market opportunities for fresh fish are expanding, due largely to the introduction and increasing availability of air freight. For example, representatives of Air Canada Cargo, the country's largest air carrier of seafood, stated that fish was among the company's top 10 types of cargo, that it had recently expanded and upgraded its cooler and freezer capability to accommodate increased volumes and had put in place specific commodity rates close to those for trucking. As well, it has published the first comprehensive guide on packing seafood for transportation by air.⁽⁴⁾

While participation by air carriers has improved the way in which fish is shipped, some difficulties were cited in packing fresh fish: the size of containers used, identification problems in the weight written on containers, the date of the catch and the date of packing. Some suppliers apparently still use imperial measures. Proper packing is necessary not only to maintain the quality and freshness of seafood, but also to prevent damage to the interior of expensive aircraft.

At the moment, the industry uses wax boxes with ice packs,⁽⁵⁾ and many witnesses expressed an interest in the small, leak proof styrofoam containers in use in the Scandinavian countries. These were considered the best available for preserving fish quality and freshness while transporting seafood by air or by land;⁽⁶⁾ besides preventing leakage and maintaining the required temperature, their design prevents the contents from being immersed in water. Another feature is their handling convenience for retailers. One witness specifically mentioned that he would like to see these containers used in transporting Pacific salmon to eastern Canada.⁽⁷⁾

⁽¹⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 5, 18 November 1986, p. 84.

⁽²⁾ Pearse (1982), p. 168.

⁽³⁾ *Ibid.*

⁽⁴⁾ Canada, the Senate, *Proceedings of the Standing Senate Committee on Fisheries*, Issue No. 9, 24 November 1986, p. 59.

⁽⁵⁾ *Ibid.*, Issue No. 13, 27 January 1987, p. 14.

⁽⁶⁾ *Ibid.*, Issue No. 12, 16 December 1986, p. 23.

⁽⁷⁾ *Ibid.*, Issue No. 13, 27 January 1987, p. 14.

To promote the transportation of products to market so as to ensure prompt delivery and maintain quality, the Committee recommends:

- (31a) That air carriers in Canada, in cooperation with the seafood industry, step up their efforts to improve fish packing and handling facilities at airports. Uniform transport packing and product identification standards should be established.**

As the world's largest fish exporter, Canada should be using the very best methods to handle and pack seafoods. The Committee therefore recommends:

- (31b) That the relevant government authorities encourage the Canadian seafood industry to develop leakproof containers to meet the requirements of the seafood market. Meanwhile, the industry should adopt the leakproof styrofoam containers in use in the Scandinavian countries.**

G. Transferring Technology

New technologies are now being developed in Canada and throughout the world, which should further enhance the quality of fish available. For example, research at the University of British Columbia was said to be developing a technique for preserving food, including salmon, in inert gas. It was believed this technique would enable the fish to remain in a fresh condition for up to six months.

Ice is an important component in preserving fish and seafood. Representatives from a wholly Canadian-owned icemaking company told the Committee of the many advantages of its icemaking and storage systems over conventional systems. The ice produced consists of round particles which can be pumped into fish containers and can flow freely between and around fish to provide superior coverage and insulation. The firmness, freshness and moisture content of fish is retained for longer periods, because this ice has a lower melting rate than conventional ice. These icemaking units were said to use less power, to be one-eighth the size, and, when installed on a fishing vessel, to have significantly lower operating costs than conventional icemaking systems.⁽¹⁾

These and other technological advances, such as the use of irradiation, may prove to be important methods of enhancing the quality and saleability of seafood. The Committee therefore recommends:

- (32) That the relevant government agencies increase their efforts to promote the transfer of technology to the Canadian seafood industry.**

⁽¹⁾ *Ibid.*, Issue No. 11, 9 December 1986, p. 23-32.

CHAPTER SIX

Summary and Conclusion

This interim report has focused on many aspects of the West Coast fisheries: the available aquatic resources and how these are managed; the interaction among user groups; and some of the commercial aspects of delivering fishery products to consumers.

The fisheries of the five species of Pacific salmon are among the most valuable of all Canada's aquatic resources – in economic, social and aesthetic terms; because those resources are limited, however, their management in the region is beset with numerous and complex problems. In formulating management decisions, the Department of Fisheries and Oceans has sought the participation of representatives from the major fishing groups. The Committee hopes that there will be increased dependence on such advice from recreational, native and commercial fishermen.

The anadromous nature of salmon and its migratory patterns have also necessitated joint management initiatives with the United States. One such initiative is the Canada-U.S. Pacific Salmon Treaty of 1985, which created the Pacific Salmon Commission. The equitable sharing of the salmon resource on transboundary rivers and the maritime boundary disputes between Canada and the United States involve a relatively small number of fish; nevertheless, these issues should be quickly resolved.

The rights of native peoples to participate in the region's fisheries must be clarified. The Committee recognizes as well the importance of recreational fishing to the economy of the West Coast, and it agrees with the government's position that the sport fishery is a qualified user of the resource.

The Salmonid Enhancement Program, now in its tenth year, has delivered outstanding results and even more significant returns are expected by the early 1990s. The Committee highly commends the federal government's recent commitment to provide new funding for this program of some \$40 million a year over the next five years. To make fuller use of enhancement, other means of financing SEP should, however, be investigated. For example, Canadians should determine the feasibility of introducing private non-profit salmon hatcheries on the West Coast.

Aquaculture is emerging as a potent factor in expanding the resource base in the region, with some \$100 million of capital funds having already been invested in B.C.

salmon farms. Government should develop a clear policy towards aquaculture based on careful planning, regulation, and public and industry consultation. Precautionary measures to prevent overexpansion of this new activity are also needed.

Herring, the second most important commercial species on the West Coast, is harvested primarily for its roe. Management of this resource is critical, as overfishing and biological factors have caused the collapse of the fishery in the past. New markets for herring roe, and alternative uses for herring carcasses, should be sought.

The groundfish fishery, though much smaller than that of the East Coast, is growing in importance. Recent increases in value registered by this species group were such that, in 1986, the total landed value (including halibut) was estimated at \$52 million, up 28% from 1985. Since shellfish and other invertebrates command relatively high market prices, their economic importance has increased as well. Poor industry returns in the early 1980s resulted in the consolidation and streamlining of processing operations in B.C., and thus increased the degree of industrial concentration. It is hoped that increasing demand for groundfish and shellfish will revitalize fish harvesting and processing in areas where these were discontinued.

The West Coast fishing industry exports over half of its production, mostly to markets with affluent consumers. New markets for West Coast fish could be opened for lower-priced and non-traditional products from both established and underharvested species.

In recent years, the demand for seafood has increased. This trend should continue as this food's nutritious and healthful qualities become better known. Moreover, through more efficient handling and transportation, seafood can now be delivered to markets more quickly and in better condition. Today, the major concern is the growing shortage of many species of fish, a shortage which has pushed prices up to unprecedented levels. While these prices may benefit the West Coast fishing industry in the short term, they could eventually weaken consumer demand.

The Committee's most important finding, perhaps, is that Canadian imports of fish and shellfish have grown substantially in the last two years, with over 80% of fishery products now consumed by Canadians being imported. Substituting domestic products for imports should therefore be a major objective, not only of the West Coast industry, but of the entire Canadian industry. To achieve this, industry must develop those species which are currently underharvested or not harvested, and expand the range of available products. The West Coast's marine resource is already important to the region's economy and, given the growing demand for seafoods, will be even more so in the future.

Summary of Recommendations

- (1) That the Canadian Section of the Pacific Salmon Commission vigorously pursue negotiations with its United States counterpart to reduce further American interceptions of salmon of Canadian origin so as to ensure that Canada gets its rightful share of the harvest. The Department of Fisheries and Oceans should also undertake a review of the overall impact of the Canada-U.S. Pacific Salmon Treaty at the end of 1987, and each year thereafter. The results of this review should be made available to the general public.

- (2a) That the Minister of External Affairs express, through the most effective diplomatic channels available to him, Canada's disagreement with the American position on the critical issue of equitably sharing the salmon stocks of the Yukon River.

- (2b) That Canadian negotiators for the Yukon River base the Canadian negotiating position on Article III, paragraph 1(b) of the Pacific Salmon Treaty which states that each party to the Treaty will receive benefits equivalent to the production of salmon originating in its waters.

- (3a) That the Government of Canada demand that the equity principle, Article III, paragraph 1(b) of the Canada-U.S. Pacific Salmon Treaty, be a priority in future negotiations with the United States on the salmon stocks of the transboundary rivers.

- (3b) That the Department of Fisheries and Oceans provide adequate funding for research to increase its data base for the region's transboundary river salmon stocks.

- (4) That the Department of Fisheries and Oceans continue to pursue its data-gathering program on foreign interceptions of Canadian salmon on the high seas. Consideration should be given to further strengthening the Department's monitoring capability on the high seas.

- (5) That the federal government reaffirm Canada's long-standing position that the A-B Line is the international boundary for both land and water inside the Dixon Entrance.
- (6a) That the Department of Fisheries and Oceans, in pursuing its habitat policy, disallow developments which impinge on fish habitats unless it can be shown, after extensive public input, that such developments are clearly in the interest of Canada.
- (6b) That the Department of Fisheries and Oceans expand and strengthen its research programs on fish habitat in the region.
- (7) That the Minister of Fisheries and Oceans periodically review the composition of the PARC, as well as user group representation on other consultative bodies to ensure that all groups are equitably represented.
- (8) That the Department of Fisheries and Oceans, in cooperation with the province of B.C., and in consultation with the fishing industry and the PARC, develop long-term plans and objectives for managing the West Coast fishery.
- (9) That the Department of Fisheries and Oceans conduct or commission a comprehensive economic analysis of the distribution of net income generated by the various gear types within the commercial sector.
- (10) That the Department of Fisheries and Oceans develop and implement plans, directions or priorities, in consultation with the fishing industry, that would reduce overcapacity in the fishing fleet.
- (11a) That the Department of Fisheries and Oceans undertake a comprehensive study to determine the relative economic and social importance of the sport and commercial fisheries of the region.
- (11b) That the federal government amend the *Fisheries Act* to recognize the sport fishery as a legitimate user of the resource deserving a fair, but not unlimited, allocation of the available fish.
- (11c) That recognition of the sport fishery's economic and social importance be reflected in the budget and resources of the Department of Fisheries and Oceans.
- (11d) That the Department of Fisheries and Oceans develop and promote, jointly with the sport and commercial fishermen, new methods to reduce the incidental catch of fish stocks in the mixed stock fishery.
- (12) That the federal government move to clarify the rights of native people to participate in and manage the fisheries of the region.

- (13a) That federal, provincial and territorial governments fully coordinate their efforts to ensure the orderly and responsible development of aquaculture. Both levels of government should develop a clear policy towards aquaculture based on well-defined goals, careful planning and regulation, and public and industry consultation. The jurisdictional and regulatory framework for commercial aquaculture should be clarified.
- (13b) That the Department of Fisheries and Oceans undertake an assessment of the effects of aquaculture operations on the marine environment.
- (14) That the Department of Fisheries and Oceans reassess the position of the northern B.C. and Yukon fisheries within the Department's organization with a view to giving the area divisional status.
- (15) That the transfer of authority for administering the freshwater fishery to the Yukon Territory proceed as planned. The federal government should also include sufficient budgetary support to ensure proper management and enhancement of the Territory's freshwater fish resource.
- (16a) That the Department of Fisheries and Oceans give greater funding priority to those projects which promote the enhancement of wild stocks of salmon.
- (16b) That the Department of Fisheries and Oceans step up its research effort to solve the problems associated with coho and chinook salmon enhancement.
- (16c) That funding be provided for the enhancement of the salmon stocks of the Stikine and Taku Rivers.
- (16d) That the Department of Fisheries and Oceans seek other forms of cost recovery which could help widen the funding base for the Salmonid Enhancement Program.
- (17) That the Department of Fisheries and Oceans and industry determine the feasibility of introducing private non-profit hatcheries into the region.
- (18) That government not be directly involved in marketing the fishery products of the West Coast.
- (19a) That future programs for fisheries management on the West Coast take into account the opportunities inherent in providing fresh fish to markets.
- (19b) That the relevant federal and provincial government agencies support cost-sharing market research studies to assist the salmon farming industry in developing promotional and market development programs.

- (19c) That market research be conducted to determine the size and potential of markets for farmed salmon. Research should also be undertaken of consumer comparisons of B.C. farmed salmon and salmon from competing producers (e.g., chinook and coho salmon and Atlantic salmon).
- (19d) That government encourage the processing and marketing of B.C. farmed salmon to be complementary to that of the traditional fishery.
- (20a) That government commission or undertake a comprehensive study of the size, nature and potential of the Canadian fish and seafood market. The study should include an analysis of per capita seafood consumption in terms of edible and round weight equivalents by species, product form and country of origin.
- (20b) That government encourage West Coast seafood producers to work cooperatively toward creating an effective distribution system for the Canadian domestic market.
- (20c) That government support any industry attempts to mount a national trade show to introduce West Coast fish processors to retailers and food service operators from other regions of Canada.
- (20d) That government enlist the wider support of the West Coast fishing industry in funding generic promotion of the region's fish products in Canada. Future promotions should include new species and products.
- (21a) That the Department of External Affairs assume the responsibility for continuously updating the worldwide market studies previously undertaken by the Department of Fisheries and Oceans, in order to assist industry in formulating export marketing plans. An analysis of how the Canadian industry compares with its major competitors should be incorporated.
- (21b) That the Department of External Affairs determine the long-term prospects of the herring roe market in Japan. The Department should also determine whether other suitable markets exist.
- (21c) That the Department of External Affairs work toward expanding Canadian industry participation at international trade shows. A more unified Canadian presence should be sought where government funding is involved.
- (21d) That government enlist the wider support of the West Coast fishing industry in funding generic programs to promote the region's fishery products in foreign markets. Future promotions should include new species and products.
- (21e) That the Department of External Affairs, in cooperation with other federal and provincial government departments, increase its contacts with fish processors on the West Coast.

- (22a) That the federal government continue to pursue its policy of separating tariff issues from issues concerning allocations of fish to foreign countries.
- (22b) That the federal government, in the forthcoming multilateral trade negotiations under the General Agreement on Tariffs and Trade, seek to improve the trading conditions for the region's fishery products in such important markets as the EEC, Australia and Japan.
- (22c) That the federal government vigorously defend in bilateral and multilateral forums, Canada's right to have its fish resources processed in Canada. The Canadian government should also make clear its position during current trade discussions with the United States as these relate to the fisheries.
- (22d) That government and industry consider jointly planning and funding a public relations campaign aimed at countering any future boycott of Canada's fishery products abroad resulting from the seal management issue.
- (23) That the sport fishing industry and government jointly begin to formulate a national strategy to better promote the sport fishery in Canadian government embassies, consulates and tourism offices throughout the world.
- (24) That government and industry vigorously undertake a comprehensive research and development program designed to utilize Pacific herring more fully for human consumption and industrial use.
- (25) That research and development be directed and funded jointly by government and industry with the ultimate goal of commercially producing surimi from Pacific hake, pollock and dogfish.
- (26) That the transfer to industry of new aquaculture technology, particularly relating to high-value shellfish, be effected as quickly as possible.
- (27) That the Department of Fisheries and Oceans move carefully in introducing more terminal fishing. The Department should determine the possible impact of changes in product quality and mix which might result from such fishing.
- (28) That the Department of Fisheries and Oceans encourage West Coast fishermen to improve fish handling techniques, such as cutting, bleeding, washing and refrigerating, at sea.
- (29) That government, with the assistance of the fishing industry, determine the feasibility of establishing a system of dockside quality grades with price differentials, on a species-by-species basis.
- (30a) That the Department of Fisheries and Oceans, in cooperation with the fishing industry, assess the feasibility of establishing a voluntary quality grading and labelling scheme for the region's fish products.

- (30b) That the Department of Fisheries and Oceans consider replacing current export restrictions on frozen sockeye and pink salmon, with a system of quality grades.
- (31a) That air carriers in Canada, in cooperation with the seafood industry, step up their efforts to improve fish packing and handling facilities at airports. Uniform transport packing and product identification standards should be established.
- (31b) That the relevant government authorities encourage the Canadian seafood industry to develop leakproof containers to meet the requirements of the seafood market. Meanwhile, the industry should adopt the leakproof styrofoam containers in use in the Scandinavian countries.
- (32) That the relevant government agencies increase their efforts to promote the transfer of technology to the Canadian seafood industry.

APPENDIX A

SELECTED FISH SPECIES OF THE PACIFIC REGION

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Abalone	<i>Haliotis kamtschatkana</i>	ormeau	Pink Abalone, Pinto Abalone, Ear-Shell, Venus' Shell
Albacore	<i>Thunnus alalunga</i> or <i>germo alalunga</i>	germon	Long finned Tuna, White Tuna, Pacific Albacore, Long finned Albacore
American Shad	<i>Alosa sapidissima</i>	alose canadienne	Alose, Common Shad, Atlantic Shad, North River Shad, Potomac Shad, Connecticut River Shad, Delaware Shad, Susquehanna Shad, White Shad
Arctic Char	<i>Salvelinus alpinus</i>	omble chevalier	Sea Trout, Ilkalu, Ekaluk (Eqaluk), Hudson Bay Salmon, Alpine Char, Hearne's Salmon,

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Arctic Char (Cont'd)	<i>Salvelinus alpinus</i>	omble chevalier	Ivitaruk (in fresh water), European Char, Arctic Salmon, Arctic Charr Trout, Copper-mine River Salmon, Blueback Trout, Greenland Charr, Quebec Red Trout
Arctic Grayling	<i>Thymallus arcticus</i>	ombre arctique	Grayling, American Grayling, Bluefish, Back's Grayling, Sailfin Arctic Grayling, Arctic Trout, Tittimeg
Arrowtooth Flounder	<i>Atheresthes stomias</i>	flétan du Pacifique	Long-Jaw Flounder, Turbot
Atka Mackerel	<i>Pleurogrammus monoptyerygius</i>	maquereau d'atka	
Atlantic Salmon	<i>Salmo salar</i>	saumon de l'Atlantique	Lake Atlantic Salmon, Ouananiche, Common Atlantic Salmon, Kennebec Salmon, Landlocked Salmon, Sebago Salmon,

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Atlantic Salmon (Cont'd)	<i>Salmo salar</i>	saumon de l'Atlantique	Black Salmon, Grayling (in N.S.), Grilt, Fiddler, Bratan
Bering Cisco	<i>Coregonus laurettae</i>	cisco du Béring	Lauretta, Herring, Freshwater Herring, Lake Herring, Tullibee
Big Skate	<i>Raja binoculata</i>	raie biocellée	
Black Rockfish	<i>Sebastes melanops</i>	sébaste noir	Black Bass
Bluefin Tuna	<i>Thunnus thynnus</i>	thon rouge	Tunny, Atlantic Tuna, Southern Bluefin, California Bluefin
Broad Skate	<i>Raja badia</i>	raie large	
Brown Rockfish	<i>Sebastes auriculatus</i>	sébaste brun	
Burbot	<i>Lota lota</i>	lotte	American Burbot, Ling Eelpout, Loche,

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Burbot (Cont'd)	<i>Lota lota</i>	lotte	Freshwater Cod, Maria (Sask., Man., Northern Ont.), Methy (Northern Canada) Lush (Alaska), Lawyer (Great Lake States)
Butter Clam	<i>Saxidomus giganteus</i>	palourde jaune	Washington Clam
Butter Sole	<i>Isopsetta isolepis</i>	plie à écailles régulières	
Canary Rockfish	<i>Sebastes pinniger</i>	sébaste canari	Orange Rockfish
China Rockfish	<i>Sebastes nebulosus</i>	sébaste à bandes jaunes	Yellowstripe Rockfish
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	saumon quinnat	Chinook Spring Salmon, King Salmon, Blackmouth, Chub Salmon, Tyee, Quinnat Salmon, Black Salmon,
Chub Mackerel	<i>Scomber japonicus</i>	maquereau blanc	Spanish Mackerel, Thimbre-Eyed Mackerel, Southern Mackerel, Pacific Mackerel

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Chum Salmon	<i>Oncorhynchus keta</i>	saumon k�eta	Chum, Silverbright Salmon, Dog Salmon, Qualla Salmon, Keta Salmon, Calico Salmon, Fall Salmon
Closespine Snipe Eel	<i>Avocettina infans</i>	avocette immature	
Coho Salmon	<i>Oncorhynchus kisutch</i>	saumon coho	Coho, Blueback, Medium Red Salmon, Jack Salmon, Silverside Silver Salmon, Sea Trout
Deepsea Sole	<i>Embassichthys bathybius</i>	plie de profondeur	
Dover Sole	<i>Microstomus pacificus</i>	sole � petite bouche	Slippery Sole, Slime Sole, Short-finned Sole
Dungeness Crab	<i>Cancer magister</i>	crabe dormeur du Pacifique	Pacific Edible Crab Market Crab
English Sole	<i>Parophrys vetulus</i>	sole anglaise	Lemon Sole, Common Sole, California Sole

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Flathead Sole	<i>Hippoglossoides elassodon</i>	plie à tête plate	
Geoduck Clam	<i>Panope abrupta</i>	geoduck	
Greenland Halibut	<i>Reinhardtius hippoglossoides</i>	flétan noir	Black halibut, Blue halibut, Lesser halibut, Mock halibut, Greenland Turbot, Newfoundland Turbot
Horse Clam	<i>Tresus capax</i> or <i>Tresus nuttalli</i>	mactre du Pacifique	Gaper, Otter Shell Empire Clam
Jack Mackerel	<i>Trachurus symmetricus</i>	carangue symétrique	Mackereljack
King Crab	<i>Paralithodes camchatica</i>	crabe royal	Japanese Crab Alaska Deepsea Crab
Lake Trout	<i>Salvelinus namaycush</i>	touladi	Togue, Touladi, Grey trout, Namaycusa, Great Lake Trout, Mackinaw Trout,

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Lake Trout (Cont'd)	<i>Salvelinus namaycush</i>	touladi	Salmon Trout, Laker, Namaycush, Masamacush, Great Grey Trout, Great Lakes Char, Landlocked Salmon, Mountain Trout, Taque
Lake Whitefish	<i>Coregonus clupeaformis</i>	corégone	Common Whitefish, Sault Whitefish, Whitefish, Eastern Whitefish, Great Lakes Whitefish, Humpback Whitefish, Inland Whitefish, Gizzard fish
Lingcod	<i>Ophiodon elongatus</i>	morue-lingue	Blue Cod, Buffalo Cod, Green Cod, Greenling, Leopard Cod, Cultus Cod
Littleneck Clam	<i>Protothaca staminea</i>	quahaug commune	Rock Cockle, Pacific Littleneck

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Manila Clam	<i>Tapes philippinarum</i>	palourde japonaise	
Northern Anchovy	<i>Engraulis mordax mordax</i>	anchois du Pacifique	North Pacific Anchovy, Plain Anchovy
Northern Pike	<i>Esox lucius</i>	grand brochet	Jackfish, Pike, Great Northern Pike, Jack, Pickerel, Great Northern Pickerel
Ocean Whitefish	<i>Caulotalitus princeps</i>	tile océanique	
Octopus	<i>Octopus</i>	pieuvre	
Pacific Barracuda	<i>Sphyraena argentea</i>	barracuda argenté	
Pacific Bonito	<i>Sarda chiliensis lineolata</i>	bonite du Pacifique	Bonito, Chilean Bonito, Californian Bonito, Australian Bonito
Pacific Cod	<i>Gadus macrocephalus</i>	morue du Pacifique	Grey Cod, True Cod, Greyfish
Pacific Hake	<i>Merluccius productus</i>	merlu du Pacifique	Whiting

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Pacific Halibut	<i>Hippoglossus stenolepis</i>	flétan du Pacifique	Butt, Chicken Halibut
Pacific Herring	<i>Clupea harengus pallasii</i>	hareng du Pacifique	North Pacific Herring
Pacific Ocean Perch	<i>Sebastes alutus</i>	sébaste à longue mâchoire	Rockfish, Menuke Rockfish, Black bass, Rock Salmon, Canary, Snapper, Longjaw Rockfish
Pacific Oyster	<i>Crassostrea gigas</i>	huître du Pacifique	
Pacific Pomfret	<i>Brama japonica</i>	castagnole mince	
Pacific Pompano	<i>Peprilus simillimus</i>	pompano du Pacifique	California Pompano
Pacific Sardine	<i>Sardinops sagax caeruleus</i>	sardine du Pacifique	
Pacific Saury	<i>Cololabis Saira</i>	balaou japonais	Mackerel-Pike, Skipper
Pacific Tomcod	<i>Microgadus proximus</i>	poulamon du Pacifique	
Petrale Sole	<i>Eopsetta jordani</i>	plie de Californie	Brill

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Pink Salmon	<i>Oncorhynchus gorbuscha</i>	saumon rose	Pink, Humpback Salmon, Gorbuscha
Pygmy Seasnail	<i>Lipariscus nanus</i>	limace naine	
Rainbow Smelt	<i>Osmerus mordax</i>	éperlan arc-en-ciel	Smelt, American Smelt, Leefish, Freshwater Smelt, Frost Fish
Rainbow Trout	<i>Salmo gairdnerii</i> or <i>Salmo irideus</i>	truite arc-en-ciel	Kamloops Trout, Steelhead Trout, Steelhead Salmon, Coast Rainbow Trout, Silver Trout, Finger Trout
Rock Sole	<i>Lepidopsetta bilineata</i>	sole du Pacifique	Roughback
Rough Pomfret	<i>Taractes asper</i>	castagnole rugueuse	
Roughscale Sole	<i>Clidoderma asperrimum</i>	plie rugueuse	
Roughtail Skate	<i>Bathyraja trachura</i>	raie à queue rude	

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Sablefish/Blackcod	<i>Anoplopoma fimbria</i>	morue charbonnière	Blue Cod, Bluefish, Alaska Blackcod, Pacific Blackcod, Candlefish, Coal Cod, Coalfish
Sandpaper Skate	<i>Bathyraja interrupta</i>	raie rugueuse	
Sidestripe Shrimp	<i>Pandalopsis dispar</i>	crevette à flanc rayé	Giant Red Shrimp
Silvergrey Rockfish	<i>Sebastes brevispinis</i>	sébaste argenté	
Skipjack Tuna	<i>Euthynnus pelamis</i> or <i>Katsuwonus pelamis</i>	bonite à ventre rayé	Bonito, Oceanic Bonito, Stripe-Bellied Bonito, Striped Tuna, Skipjack
Slender Sole	<i>Lyopsetta exilis</i>	plie mince	
Sockeye Salmon	<i>Oncorhynchus nerka</i>	saumon rouge	Sockeye, Red Salmon, Blueback Salmon, Quinalt,

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Sockeye Salmon (Cont'd)	<i>Oncorhynchus nerka</i>	saumon rouge	Kokanee, Kickinee, Little Redfish, Landlocked Sockeye, Kennerly's Salmon, Silver Trout, Yank, Blueback Red Salmon
Spiny Dogfish	<i>Squalus acanthias</i>	aiguillat commun	Dogfish, Spring Dogfish, Greyfish, Picked Dogfish, Spiky Dogfish, Common Spiny fish, Blue Dog, Darwen Salmon, Spurdog, Rock Salmon, Piked Dogfish, Pacific Dogfish
Spot Prawn	<i>Pandalus platyceros</i>	crevette tachetée	Spot Shrimp
Squid	<i>Loligo illex</i>	calmar encornet	

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Starry Flounder	<i>Platichthys stellatus</i>	plie du Pacifique	Long-jaw Flounder, Flounder, Grindstone
Surf Smelt	<i>Hypomesus pretiosus pretiosus</i>	éperlan argenté	Silver Smelt
Swordfish	<i>Xiphias gladius</i>	espadon	Broadbill
Twinpored Eel	<i>Xenomystax atrarius</i>	anguille à pores jumelées	
Walleye Pollock	<i>Theragra chalcogramma</i>	morue du Pacifique occidental	Alaska Pollock, Bigeye Pollock Pollack
White Croaker	<i>Genyonemus lineatus</i>	tambour rayé	King Croaker, Tomcod, Roncador, Kingfish
White Sea Bass	<i>Cynoscion nobiliis</i>	acoupa blanc	White Weakfish
White Seaperch	<i>Phanerodon furcatus</i>	ditreme fourchu	
White Sturgeon	<i>Acipenser transmontanus</i>	esturgeon blanc	Pacific Sturgeon, Oregon Sturgeon, Columbia Sturgeon, Sacramento Sturgeon

ENGLISH COMMERCIAL NAME	LATIN NAME	FRENCH COMMERCIAL NAME	OTHER ENGLISH NAMES
Whitebait Smelt	<i>Allosmerus elongatus</i>	éperlan blanchaille	
Yelloweye Rockfish	<i>Sebastes ruberrimus</i>	sébaste aux yeux jaunes	Pacific Red Snapper, Red Snapper
Yellowfin Sole	<i>Limanda aspera</i>	limande à nageoires jaunes	
Yellowtail	<i>Seriola lalandei dorsalis</i>	sériole à queue jaune	California Yellowtail
Yellowtail Rockfish	<i>Sebastes flavidus</i>	sébaste à queue jaune	

The English commercial, French commercial, and Latin names are all subject to change and may vary from one text to another.

Sources: Department of Fisheries and Oceans, Marketing Directorate, Promotions Branch, *Canadian Fish Products: Pacific Region*, Supply and Services Canada 1985; Department of Fisheries and Oceans, Marketing Services Branch, *Canadian Fish Products: Pacific Region*, Supply and Services Canada 1981; W.B. Scott and E.J. Crossman, *Freshwater Fishes of Canada*, Bulletin 184, Fisheries Research Board of Canada, Ottawa 1973; J.L. Hart, *Pacific Fishes of Canada*, Bulletin 180, Fisheries Research Board of Canada, Ottawa 1973; Organization for Economic Co-operation and Development, *Multilingual Dictionary of Fish and Fish Products*, 2nd ed., Fishing News Books Limited, Farnham, England, 1978.

APPENDIX B

GLOSSARY OF TERMS

Anadromous Fish — Any fish which migrate from the sea into freshwater rivers for the purpose of spawning.

Aquaculture — Culture or husbandry of finfish, shellfish and aquatic plants.

Bleeding and Gutting — One of the sequence of events in the proper on-board handling of groundfish. While the fish is still alive, it should be bled (by cutting its throat) to reduce the chance of blood spots and bruising. It is then dressed by slitting its belly and removing the stomach and other organs so as to retard the process of decomposition. The fish are then washed and put on ice, preferably in boxes.

BroodStock — Adult animals used as a source of eggs or juvenile organisms.

By-Catch — A fish species caught in addition to the target species.

Enhancement — Any measure taken to improve the abundance of fish stocks. Enhancement may include management strategies (i.e., reducing the fishing effort, imposing size limits, etc.), but the word more generally implies biological and habitat interventions that increase production. These may range from improving fish habitat (e.g., stream clearing), to providing access to spawning areas (e.g., installing fish ladders), to providing new spawning areas (e.g., making spawning channels). Enhancement may be indirect, as when lakes are fertilized, or direct, as when hatcheries are used to increase or replace natural production.

Equity Principle — A concept in the Pacific Salmon Treaty between Canada and the United States whereby each country will receive benefits in proportion to the amount of salmon originating in its own waters.

Escapement — The unharvested portion of a fish population, usually wild salmonids, that escape to spawn.

Finfish — Fish with fins; not shellfish.

Fish Habitats — Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly to carry out their life processes.

Fish Habitat Management Plan — A plan prepared for a region or a specific area of a region and which includes an outline of the Department's requirements for conserving, restoring and developing fish habitat to meet fisheries production objectives. It is used as the basis for consultation in integrated resource planning.

Fisheries Resources — Fish stocks or populations that sustain commercial, recreational or native fishing activities.

Fresh Fish — Fish that has not been subjected to preservation.

Frozen Fish — Fish which, if in the form of a 25 millimetre-thick block of unpackaged fillets, has been frozen to a centre temperature of no more than -21° .

Gillnet — A long rectangular net, usually anchored near the ocean bottom, which catches fish by entanglement or snaring at the gills. If such nets are not tended frequently, fish die in them and fish quality deteriorates.

Groundfish — The collective term used to describe species that feed near the ocean bottom.

Habitat Conservation — The management of human activities to prevent the destruction of fish habitats.

Habitat Development — The creation of fish habitat and any enhancement or improvement of fish habitat to provide better conditions for production and maintenance of the fisheries resource.

Habitat Restoration — The treatment or clean-up, for the purpose of increasing its capability to sustain a productive fisheries resource, of fish habitat that has been altered, disrupted or degraded.

Hatchery — Aquaculture facility for hatching and rearing juvenile fish.

Interception — The capture of fish in a fishery directed to another stock or species. The term is mostly used in connection with salmon which are fished during their shoreward migration. The "by-catch" is the result of such interception.

Invertebrate — Without a backbone or spinal column.

Landed Value — Prices paid for the first sale of the fish or shellfish as landed by fishermen.

Longline — A line of baited hooks, anchored to the ocean bottom and retrieved at intervals by a vessel called a longliner.

Marketing — A group of related business activities whose purpose is to satisfy consumer demands for goods and services. Involved are product design, development, distribution, advertising, promotion, and publicity, as well as market analysis. In simple terms, marketing is the total process of moving goods and services from the producer to the end-user.

Mark Recapture — A scientific assessment program where fish are marked to identify stocks, to determine movements and migrations, and to estimate population parameters, particularly size, mortality and exploitation rates.

Maximum Sustainable Yield — The largest average catch that can be continuously taken from a fish stock.

Ocean Ranching — Use of the natural aquatic environment as free feeding grounds for cultured fish.

Over-the-Side — Sales of fish from a fishing vessel direct to a processing vessel.

Parr — Young salmon before it leaves freshwater for the sea.

Pelagic Species — Fish that swim near the surface, usually in large schools.

Piece — A term used by the salmon fishery to refer to one unit.

Pot — A baited chamber which fish can easily enter but from which they are unable to escape.

Purse Seine — A commercial fishing net that is particularly suitable for capturing schools of fish such as salmon and herring. When placed in position, it stands like a fence in the water around a school of fish. It is supported at the surface by floats of metal, cork, or glass and held down by weights along the bottom. A pursing rope is strung through large metal rings along the bottom of the net. When the rope is tightened, the bottom is drawn, to form a huge purse.

Recovery Rate — The percentage of whole fish that is used.

Roe — Fish eggs, usually still enclosed in the ovarian membrane. To be edible, roe must be obtained at a specific point of development.

Round Weight — This term is generally used in the industry to refer to the weight of fish as purchased from a vessel. Fisheries statistics use the term "round weight" to refer to the live weight of fish.

Salmonid Enhancement Program — A federal-provincial program aimed at restoring salmon and sea-run trout to historic abundance by various strategies (e.g., spawning channels, stream incubators, fishways, stream clearance, hatchery rearing of juveniles).

Shatterpack — These consist of whole fillets separated by polyethylene. The name shatterpack is used because, when dropped a short distance on to a hard surface, the fillets easily separate.

Shellfish — Any aquatic invertebrate animal with a shell, such as a mollusc or crustacean. The term may also include echinoderms.

Spawn-on-Kelp — This consists of Pacific herring eggs deposited naturally on kelp. It is usually obtained by impounding ripe herring in a net-pen with kelp for them to spawn on. The kelp and attached eggs are salted prior to shipment to Japan.

Species — A discrete group of plants or animals that transmit specific characteristics from parent to offspring.

Stock — A population of fish of one species that congregates and/or migrates within a given geographical area. There may be several stocks of fish within each species. As in the case of salmon, the fish in each stock are genetically distinct, even though they belong to the same species.

Surimi — A semi-processed fish protein. There are two types of surimi: frozen surimi, a frozen block of washed minced fish meat to which sugar and other ingredients have been added, and fresh surimi, consisting of wet fish protein only.

Tonne (Metric Ton) — One thousand kilograms (2,204 lbs). A standard unit of measurement in fisheries statistics.

Trawling — A method of commercial fishing in which a boat drags a large conical net or trawl along the sea bottom. The net is closed at the small end and held open mechanically at the mouth or large end. Trawls may be floated and dragged at various depths between the surface and bottom. Bottom trawling is primarily for groundfish, while midwater trawling is for pelagic species such as herring.

Trolling — A method of angling in which a hook and line with an artificial lure or natural bait is drawn behind a moving boat at any depth from the surface to the bottom and at varying speeds according to the species of fish being sought. Trolling is carried out from all types of craft and with many types of tackle, from a handline to heavy big-game gear.

Value of Production — Value of fishery products after processing. In most cases, this is "free-on-board" (f.o.b.) plant value.

APPENDIX C

ABBREVIATIONS

S.E.P.	Salmonid Enhancement Program
D.F.O.	Department of Fisheries and Oceans
D.E.A.	Department of External Affairs
T.A.C.	Total Allowable Catch
M.A.C.	Minister's Advisory Council
P.A.R.C.	Pacific Regional Council
P.E.M.D.	Program for Export Market Development
S.A.C.	Seafood Advisory Council
F.C.C.	Fisheries Council of Canada
F.C.B.C.	Fisheries Council of British Columbia
F.F.M.C.	Freshwater Fish Marketing Corporation
E.E.C.	European Economic Community
G.A.T.T.	General Agreement on Tariffs and Trade
F.A.O.	Food and Agriculture Organization
U.F.A.W.U.	United Fishermen and Allied Workers Union
I.F.A.W.	International Fund for Animal Welfare

APPENDIX D

WITNESSES

ISSUE No.	DATE	ORGANIZATIONS AND WITNESSES
1	November 4, 1986 Ottawa, Ontario	Fisheries Council of Canada Mr. Ron W. Bulmer President
2	November 7, 1986 Ottawa, Ontario	Department of Fisheries and Oceans Dr. Ward Falkner Director General Fisheries Operations Directorate Mr. Pat Chamut Director General Pacific Region Mr. Al Wood Director Regional Planning and Economics Branch Pacific Region Mr. Nilo Cachero Chief Market Intelligence Group Commercial & Market Analysis Division Economic & Commercial Analysis Directorate Department of External Affairs Mr. Dennis B. Browne Director General Agriculture, Fish and Food Products Bureau Mr. David Shortall Deputy Director Fisheries and Fish Products Division
3	November 14, 1986 Whitehorse, Yukon Territory	His Worship the Mayor of Whitehorse Mr. Don Branigan

Yukon Chamber of Commerce

Ms. April Neave
Manager

**The Minister of Renewable Resources of
the Yukon Territory**

The Hon. David P. Porter

**Department of Renewal Resources of the
Yukon Territory**

Mr. W.J. Klassen
Deputy Minister

Mr. Mark Hoffman
Policy Analyst

Yukon P.C. Caucus

Mr. Bill Brewster
M.L.A for Klwane and Critic
for Renewable Resources

Mr. Gordon Steale
Director of Research

Department of Fisheries and Oceans

Mr. Sandy R.A.C. Johnston
Management Biologist
Yukon and Northern B.C.
Fraser River
Northern B.C. and Yukon Division
Field Services Branch

Council for Yukon Indians

Mr. Mike Smith
Chairman

Mr. Richard Sidney
Vice-Chairman
Land Claims Department

Ice House Yukon Ltd

Mr. John Clark
Manager and Owner

**Champagne/Aishihik Indian
Band**

Mr. Paul Birckel
Chief

Mr. Chuck Hume
Counsellor

Mr. Dave Joe
Legal Advisor

ISSUE No. DATE

**ORGANIZATIONS AND
WITNESSES**

- 4 November 17, 1986
Prince Rupert,
British Columbia
- Peacock Yukon Camps Ltd.**
Mr. John Peacock
Owner
- Howard Paish and Associates**
Mr. Howard Paish
Owner
- Trans-Boundary River Northern Panel
Pacific Salmon Commission**
Mr. Ray Kendel
Representative
- Prince Rupert Chamber of Commerce**
Mr. Brian Eby
President
Mr. Phil Eidsvik
Chairman
Economic Development Committee
- United Fishermen and Allied Workers
Union**
Mr. Jim Rushton
Northern Representative
Mr. Joseph Louesar
Representative
- Northern Native Fishing Corporation**
Mr. John Wytenbroeck
General Manager
Mr. Ted Wilson
Trade Officer
- Prince Rupert Fishermen's Coop**
Mr. Robert Strand
Fleet Manager
Mr. Bob Jongewaard
Representative
- Prince Rupert Fish Exchange**
Mr. Gene Simpson
Past President and
Vice-President of the
British Columbia Packers Ltd.
Mr. Myles McLeod
Past President and
General Manager of the
Canadian Fishing Company

ISSUE No.	DATE	ORGANIZATIONS AND WITNESSES
5	November 18, 1986 Campbell River, British Columbia	<p>Native Brotherhood of B.C. Mr. Gary Alexcee Trustee</p> <p>Prince Rupert Fishing Vessel Owners' Association Mr. George Haugan Director Motor Vessel Ocean Cape</p> <p>Mr. Gordon Stava Director Motor Vessel Christov</p> <p>His Worship the Mayor of Campbell River Mr. Robert V. Ostler</p> <p>Campbell River Chamber of Commerce Mr. Peter Dutton President</p> <p>Individual presentation Mr. Ralph Shaw, C.M.</p> <p>Individual presentation Mr. Ron MacLeod</p> <p>Cape Mudge Band Council Mr. Ralph Dick Chief Councillor</p> <p>Mr. Jim Wilson Band Councillor</p> <p>Campbell River and District Salmon Seiner's Association Mr. David Snyder Secretary-Treasurer</p> <p>Individual presentation Mr. Robert H. Jones Outdoor Writer and Recreational Fisherman</p> <p>Phillips Arm and Mainland Inlets Salmon Enhancement Society Mr. James Lornie President</p> <p>Mr. Eric Rhome Biologist</p>

ISSUE No. DATE

**ORGANIZATIONS AND
WITNESSES**

- Campbell River Local United Fishermen
and Allied Workers' Union**
Mr. Rick Frey
President
Mr. Mike Murphy
Vice-President
- Individual presentation**
Mr. Thor T. Peterson
- Pine Enterprises (Marine Division)**
Mr. Lawrence Foorx
- Quadra Island Salmon Enhancement
Society**
Mr. Barry Bennett
Treasurer
- 6 November 19, 1986
Campbell River,
British Columbia
- Ministry of Agriculture and Food of the
Province of British Columbia**
Mr. James Fraalick
Provincial Aquaculture
Co-ordinator
Aquaculture and Commercial
Fisheries
- Department of Fisheries and Oceans**
Mr. George Hunter
Federal Aquaculture Coordinator
Fisheries Research Branch
Pacific Biological Station
- Syndel Laboratories Ltd.**
Mr. J.M. Little
President
- Ministry of Forests and Land of the Prov-
ince of British Columbia**
Dr. Tom Cockburn
Senior Policy Analyst
Policy and Documentation Section
Mr. D.C. (Doug) McCall
Regional Director
- Mariculture Association of B.C.**
Mr. R. Ward Grieffioen
President
- 7 November 20, 1986
Nanaimo, British Columbia
- His Worship the Mayor of Nanaimo**
Mr. Graeme Roberts

ISSUE No. DATE

**ORGANIZATIONS AND
WITNESSES**

8 November 21, 1986
Victoria, British Columbia

Nanaimo Chamber of Commerce
Mr. Doug McBride
President

Ucluelet Seafood Processors Ltd.
Mr. Paul Bourke
President

Pacific Charter Sport Fishing Association
Mr. Robert H. Waters
Secretary-Treasurer

Sport Fishing Advisory Board
Mr. Jim Gilbert
Member

**Nanaimo River Salmonid Enhancement
Project**
Mr. Paul Preston
Project Manager

Sport Fishing Institute of British Columbia
Mr. George R. Nosky
Member

Qualicum Band of Indians
Ms. Diana Recalma
Manager

Individual presentation
Mr. H.E. Jenkinson
Commercial Fisherman

Individual presentation
Mr. William Hawthornthwaite
Commercial Fisherman

**Her Worship the Mayor of the City of
Victoria**
Mrs. Gretchen Brewin

Greater Victoria Chamber of Commerce
Mr. Jim Currie
President

Department of Fisheries and Oceans
Mr. Patrick S. Chamut
Regional Director General
Pacific Region

Mr. John Davis
Regional Director of Science

ISSUE No. DATE

**ORGANIZATIONS AND
WITNESSES**

Mr. Charles Campbell
Acting Director
Inspection Branch

Mr. Al Wood
Director
Analysis Branch
Pacific Region

Mr. Peter Leitz
Economist

**Ministry of Agriculture and Food of the
Province of British Columbia**

Mr. James Anderson
Acting Director
Aquaculture and Commercial
Fisheries Branch

B.C. Wildlife Federation

Mr. E.H. Vernon
Director

**United Fishermen and Allied Workers'
Union**

Mr. John Radosevic
Representative

Individual presentation

Mr. Gordon Hanson
M.L.A. of the Legislative
Assembly of B.C. (Victoria)

Amalgamated Conservation Society

Mr. Robert J. Rogerson
President

UFAW Shoreworkers Union

Mr. Gilles Anctil
(B.C. Packers)

9 November 24, 1986
Vancouver,
British Columbia

British Columbia Chamber of Commerce

Mr. Colin Smith
Vice-President

Fisheries Council of British Columbia

Mr. Mike Hunter
President

Mr. Harvey Wright
Executive Director

Mr. Bruce Buchanan
Chairman

Jet Set Sam Service Inc.

Mr. Brian Fisher

Mr. John Reynolds

M.L.A. of the Legislative
Assembly of B.C.

(West-Vancouver — Howe Sound)

Sport Fishing Advisory Board

Mr. H.R.B. Paterson, C.A.

Director

Mr. Peter Broomhall

Member

Air Canada

Mr. W.A. (Bill) Shufflebotham

Account Representative

Cargo Sales and Services

Mr. Roger P. Gadslen

Cargo Sales and Service Manager

British Columbia Mainland

Indian Homemakers' Association of B.C.

Mrs. Rose Charlie

President

Mrs. Kathleen Jamieson

Consultant

Mr. Floyd Faircrest

Counsellor — Alcohol and

Drug Abuse

Mrs. Sue Morrissette

Counsellor — Alcohol and

Drug Abuse

Miss Myrle Greene

Secretary

Albion Fisheries Ltd.

Mr. Mark Hills

Director of Sales and

Marketing Manager

Islands Trust

Mrs. Carol Martin

Vice-Chairman

Gulf Trollers Association

Mr. Richard Tarnoff

Vice-President

ISSUE No. DATE

**ORGANIZATIONS AND
WITNESSES**

- Taku River Tlingit**
Mr. George Esquiro
Fishery and Tourism Officer
- STO':LO' Tribal Council**
Chief Bill Williams
Chief Clarence Pennier
- B.C. Salmon Farmers' Association**
Mr. Garth Hopkins
Director of Communications
- Union of B.C. Indian Chiefs**
Mr. Saul Terry
President
- Blackcod Longliners' Association**
Mr. Eric Wickham
- Pacific Trollers Association**
Mrs. Joan Lemmers
- 10 December 2, 1986
Ottawa, Ontario **Pelican Fishery Ltd.**
Mr. Gilles Roy
President
- 11 December 9, 1986
Ottawa, Ontario **Department of Fisheries and Oceans**
Mrs. Mary Walsh
Director
Regulations and Enforcement
Branch
- IBE Biosystems (Canada) Inc.**
Mr. Thomas Saito
President
- Sunwell Engineering Company
Limited**
Mr. S.A. (Stu) Ferguson
Product Sales Manager
- 12 December 16, 1986
Ottawa, Ontario **Loeb Inc.**
Mr. Basil Somers
Vice-President of Perishables
- Ottawa Meat and Fish Wholesale Sup-
pliers**
Mr. Brian Fletcher
Director of Purchasing

ISSUE No.	DATE	ORGANIZATIONS AND WITNESSES
13	January 27, 1987 Ottawa, Ontario	<p>Steinberg Inc. Mr. Stephen Ashe Director of Operations Ottawa Zone</p> <p>Mr. Robert Léonard Director Procurement and Merchandising —Delicatessen</p> <p>Mr. Claude Larose Head Buyer Procurement and Merchandising —Delicatessen</p>
14	March 3, 1987 Ottawa, Ontario	<p>Rycott Wholesale Foods Ltd. Mr. John Ricottone Secretary-Treasurer</p> <p>The Fish and Chip Shoppe Mr. Douglas Casimiri Owner</p> <p>Steinberg Inc. Mr. Jean-Pierre Chénier First Trainer Ottawa Zone</p>
16	March 31, 1987 Ottawa, Ontario	<p>Waldman Division of Provigo Distribution Inc. Mr. André Arseneault General Manager</p>
17	May 12, 1987 Ottawa, Ontario	<p>Metron Instruments Inc. Mr. Alastair Allan President</p> <p>Mr. Peter Vilks Vice-President — Marketing</p> <p>Mr. Robert Hattin Marketing Manager</p>
19	June 9, 1987 Ottawa, Ontario	<p>Institut Armand-Frappier Dr. Marcel Gagnon, Ph.D. Director Research Centre and Applied Food Service and Executive Director of the Canadian Irradiation Centre of Canada</p>

ISSUE No. DATE

**ORGANIZATIONS AND
WITNESSES**

Mr. Raymond Charbonneau, M.Sc.
Professor
and
Director of Research of the
Canadian Irradiation Centre of
Canada

Dr. Gilles Lamoureux, M.D., Ph.D.
Professor of Immunology

In attendance

**Atomic Energy of Canada,
Radiochemical Company**

Mr. Bruce K. Wilson
Director of Marketing
Industrial Irradiation Division
and
Executive Director of the
Canadian Irradiation Centre of
Canada



