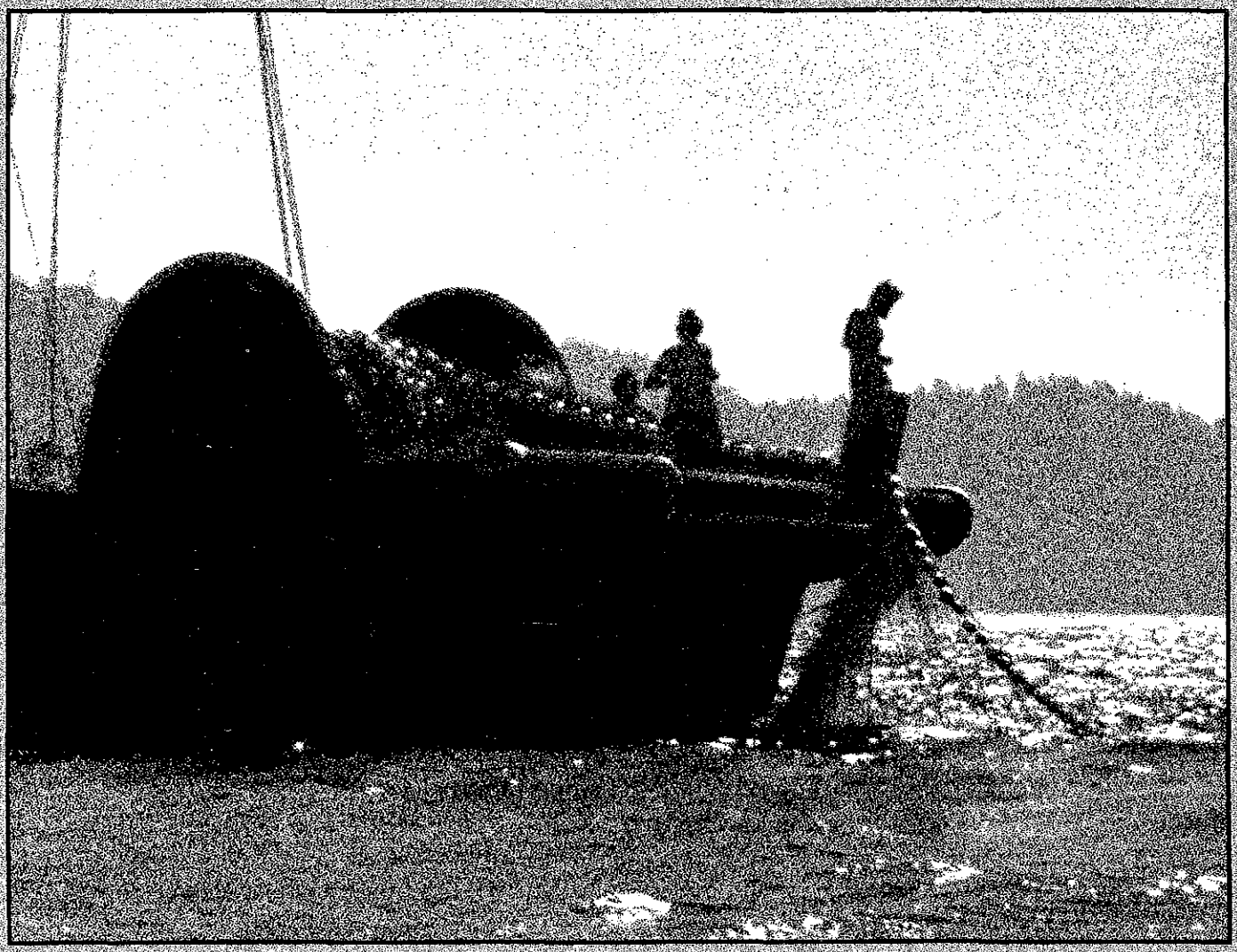

FIELD SERVICES BRANCH

1982 Review

FISHERIES AND OCEANS
PACIFIC REGION

Canada

Field Services Branch

1982 Review

Fisheries and Oceans
Pacific Region

Government of Canada
Fisheries and Oceans

Gouvernement du Canada
Pêches et Océans

Field Services Branch
Department of Fisheries and Oceans
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Cover photo by Marj Trim: Salmon seiner in Barkley Sound

Contents

Directors' Reports

Field Services

I am very pleased to provide some introductory comments to the 1982 Review of activities of the Field Services Branch, Department of Fisheries and Oceans, Pacific Region.

The Field Services Branch is often described as the leading or cutting edge of the Department, as it is the group which has responsibility for the day-to-day management of the fisheries and for the enforcement of the various Fisheries Acts and Regulations and for the protection of the resource.

The Branch is now totally decentralized, with area managers in Nanaimo and New Westminster and a director in Prince Rupert. Collectively, they manage operations in ten districts and 30 subdistricts. Each area office now has the capability to deal with many of the responsibilities of the Branch, such as vessel licencing and insurance, inspection of processing facilities and products, enforcement of fisheries regulations, management of fisheries and habitat issues.

A number of new initiatives were undertaken in 1982 which reflect the present emphasis of the Branch.

A special covert operation was undertaken in 1982 against salmon poaching on the Fraser River and the illegal sale of such fish. While the results of this exercise were somewhat controversial, they demonstrated the magnitude of the poaching problem and reaffirmed the Branch's dedication to a strong enforcement program

We are also pleased to report that new regulations dealing with the registration and licencing of fishing vessels came into being. In addition to setting out more clearly the terms and conditions of vessel licencing, they should form a sound basis on which fleet rationalization can be developed.

I am also pleased to note the establishment of closer ties between our Branch and Fisheries Research in order to encourage the development of joint programs for the creation and application of more precise salmon management tools. Techniques, such as electrophoresis and scale analysis, used for the identification of salmon runs and to assess the size of components of intermingled runs, should be of very great value to our managers in the future.

The three-area system for the management of the roe herring fishery was employed successfully for the second year in 1982. However, the fixed quota management system under development ultimately should be an even better approach to the fishery.

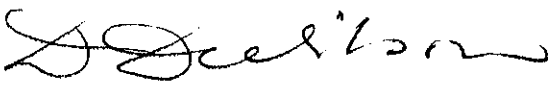
The Branch has a very significant responsibility for the protection of fish habitat. This can often be an area of conflict with other resource users, where their encroachment can harm or endanger fish and their habitat. In order to help resolve such conflicts, the Department is developing a policy of "No Net Loss" with respect to such matters, in the hope that the concept will provide reasonable grounds for the resolution of such differences and for the maintenance of the productive capacity of fish habitat.

In 1983, we will continue to upgrade and improve the Department's radio communication network, as well as improve staff housing at various isolated posts on the coast.

In 1982, a new senior management team was established in Ottawa, with the appointments of Dr. Art May as deputy minister and Gary Vernon as assistant deputy minister.

I extend my appreciation to the staff for their continuing dedication and hard work in the face of very difficult challenges.

I trust that you will find the 1982 report both interesting and useful in understanding the work and activities of the Branch.



D. D. Wilson,
Director,
Field Services Branch.

Northern Operations

The 1982 salmon season in the North Coast was characterized by high fishing effort, a record return and catches of Skeena sockeye and disappointing returns of pink and chum. It was a challenging season, for our managers were faced, in many cases, with too many boats for the few fish available.

As predicted, the salmon season saw concentrated fishing by a large fleet in specific areas. The returns to the Skeena system were larger than expected, and the fleet was regulated to exploit this run in periods of not more than two or three days at a time. Fishing times were controlled to attempt to allow additional wild stocks of sockeye, chinook and steelhead to escape the commercial fishery and head for spawning grounds.

As expected, the Central Coast failed to produce pink salmon. This fact, combined with the poor fishing opportunities in the south, resulted in large fleets in the north. For example, during one opening, 400 seiners and 1,200 gillnetters fished north of Cape Caution. The Queen Charlottes had the largest seine effort on record. Similarly, large numbers of gillnets fished Smith Inlet; the sockeye return was greater than expected and the fleet fished for an extended period. Escapements to the Smith Inlet in 1982 were also the highest on record.

The Rivers Inlet sockeye return was sufficient for a good escapement. The strength of this run is increasing and a much-improved fishery is hoped for in the future.

Chinook conservation measures were imposed in 1982 in the north coast: a two-week northern troll closure during the last half of June and implementation of a quota on the net catch in Areas 1 and 2W. Millbanke Sound was closed during July as a chum conserva-

tion move, but the closure also benefited chinook. Further conservation measures for all groups are required in 1983 in order to comply with the Canada-U.S.A. agreement.

Consolidation of processing plants in the north continued during 1982. Port Edward was closed, leaving the Cassiar plant as the only operating plant on the Skeena River. Oceanside has expanded to become the largest salmon cannery in B.C.

The 1982 roe herring season was a success. The fishery was well managed; a team approach was used in all areas. The anticipated catches, the seine/gillnet ratio of catch, quality and roe yield of catch were all met. Spawn levels were relatively high in comparison to previous years; however, there was some concern due to the preponderance of older fish and the apparent lack of recruitment. Nevertheless, the quality and age of the fish provided high roe yields for fishermen and processors.

Groundfish landings were down in Prince Rupert in 1982, due to poor market conditions and to the closure of Seal Cove, which had operated as a cold storage plant for 70 years.

The northern B.C. area (Areas 1-5) and south-eastern Alaska were the locations of the largest tagging program on sockeye and pink salmon ever conducted on the Pacific coast. This program, a joint Canada-U.S. research venture, was initiated in response to the lack of adequate data revealed in international negotiations to define equitable harvests of salmon stocks subject to interceptions. The results of the tagging will help settle disputes regarding the interception of sockeye and pink in these areas.

The Northern Operations Branch continues to expand under the Region's decentralization program. During the year, Divisional staff increased--a senior habitat biologist, a habitat technician and an administration officer have joined ranks. In addition, the Branch established a fully-operational licencing section and issued 5,006 licences and tabs in 1982.

I wish to express my appreciation for the effort and dedication that the Northern Operations staff have demonstrated in the management of the fisheries resource. I am also appreciative of the support which has enabled me to carry out my role.

Eric Kremer,
Director,
Nothern Operations.

Fraser River, Northern B.C. and Yukon

The Fraser River, Northern B.C. and Yukon Division encompasses a geographical area of approximately 1.3 million square kilometres, including the watershed of the Fraser River, the salmon-bearing streams known as transboundary rivers (originating in northern B.C., and terminating in U.S. waters in the State of Alaska) and the entire Yukon Territory. In the Yukon Territory, unlike in the province of B.C., the Department is responsible for managing freshwater species as well as anadromous fish.

During 1982, habitat management responsibilities continued to demand a large commitment of manpower and resources in this Division. Physical habitat and chemical pollution problems continued to degrade salmon habitat, and litigation has required significant amounts of field officers' time.

Although the lowered price of gold prevented the placer mining industry in B.C. and Yukon from expanding in 1982, the record number of existing claims and operations stretched staff to a maximum level. A high priority was put on a review of the B.C. system and the development of an extensive management package to protect fish in the Yukon. The Fisheries position, developed in cooperation with the Department of Environment and Department of Indian and Northern Affairs will be presented to a public inquiry in 1983.

Once again, a concerted effort was made to combat the illegal capture of salmon in the Fraser River system. In 1982, a major undercover operation was undertaken which resulted in charges being laid against 130 individuals accused of selling fish illegally.

The total return of chinook salmon to the Fraser River in 1982 improved

DFO technicians sample chinook on the Chilko River.

significantly compared to returns for the past several years. However, a relatively high exploitation rate on chinook within the river limited the number reaching the spawning grounds, although there was a substantial increase in escapements to the Harrison River. It will be several years before it can be determined whether or not the higher returns in 1982 represent the beginning of an upward trend.

A major tagging program in the Yukon River provided new information on the migratory patterns and spawning distri-

bution of chinook and chum salmon. The information will assist in management of this important fisheries resource.

Also in Yukon Territory, work continued on a project designed to provide basic information on productivity and potential fish yields of Yukon lakes.

Contact: Fred Fraser,
Area Manager,
Fraser River, Northern B.C.
and Yukon Division.

Kamloops District

District 1 is comprised of 220,000 km^2 of the upper Fraser River watershed, with terrain ranging from mountains to plateaus. There are no tidal waters within the District. The southern boundary extends from North Bend to the U.S./Canada border at Osoyoos; the northern boundary being the Driftwood River; the western boundary is Burns Lake, and the eastern boundary is east of Tête Jaune Cache to near Revelstoke. The District office is located at Kamloops, with subdistrict offices located at Prince George, Quesnel, Williams Lake, Lillooet, Clearwater and Salmon Arm.

The principal functions within the District are habitat protection, management of the Indian food fishery, and the enforcement of the regulations covering these matters.

Commercial Salmon Fishery

No commercial fisheries are undertaken within the District.

Sport Fishery

Sockeye, pink and chum salmon are illegal to take in any manner from nontidal waters, except in the Indian food fishery. Since all waters within District 1 are nontidal, there are no sport fisheries for these species. The B.C. Sport Fishing Regulations permit the taking of chinook and coho salmon over 20 cm from nontidal waters; however, chinook over 50 cm can not be taken from the Fraser River watershed. A limited sport fishery for jack chinook and coho developed in the South Thompson River and the Fraser River near Lillooet. Estimations of total catches would be 700 chinook and 300 coho.

Table 1

KAMLOOPS DISTRICT

1982 Sport Fish Catches*

Species	Nontidal
Sockeye	--[1]
Coho	300
Pink	--[1]
Chum	--[1]
Chinook	700
Steelhead	NA[2]

* Estimate only.
1 Closed.
2 Not available.

Indian Food Fishery

Several meetings involving native Indians, International Pacific Salmon Fisheries Commission personnel and this Department's staff were held prior to the fishing season to discuss stock strength, closures, and management objectives. As in 1981, no major enforcement difficulties were encountered.

Poor sockeye catches were taken from the Early Stuart run; however, more than adequate catches were taken from the Adams River run.

Approximately 60 Indian bands situated throughout District 1 participated in the fishery. Over 60 percent of the total catch was taken from the Fraser River (North Bend to Lillooet fishing area).

Table 2

KAMLOOPS DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	152,881
Coho	625
Pink	--[1]
Chum	--[2]
Chinook	4,586
Steelhead	NA*
Total	158,092

* Not available.
[1] Not present in even years.
[2] District not frequented by chum.

Salmon Escapements

The sockeye escapement of 4,024,280 to District 1 during 1982 was the largest on record. The Adams River sockeye escapement was in excess of 2,000,000, exceeding by 35 percent the previous record set in the brood year. Other significant sockeye escapements occurred in the Little River (231,935, representing a 186 percent increase over the brood year), Lower Shuswap (513,925, representing an increase of 175 percent over the brood year) and Chilko River (242,000).

The early Stuart sockeye escapement to the Stuart Lake system was disappointing. Of the estimated 90,000 sockeye that entered the Fraser River, only 4,560 were enumerated on the spawning grounds. Of the total run that entered the Fraser River, 40,000 were taken by the Indian food fishery, and the balance were believed to be lost due to fish mortality caused by severe stress, developed when the run encountered high water levels and high water temperatures.

Coho escapements were down from the brood year by 19 percent. A large percentage of this decline occurred in the Salmon Arm subdistrict. Chinook escapements, although down 19 percent from the brood year, were up approximately 10 percent over the 1980 and 1981 escapement. The greatest loss occurred in the Lower Shuswap River, where 2,500 spawned in 1982, and 10,400 in the brood year.

Table 3

KAMLOOPS DISTRICT

1982 Salmon Escapements

Species	Escapements	Brood Year
Sockeye	4,024,280	2,270,364 (1978)
Coho	10,752	13,288 (1979)
Pink	--[1]	
Chum	--[2]	
Chinook	46,308	57,740 (1978)
Steelhead	NA*	

* Not available.
[1] Not present in even years.
[2] District not frequented by chum.

Habitat

Matters relating to habitat continue to be the highest priority within the District. Field personnel devote up to 80 percent of their working hours to habitat matters. With 112 salmon-producing streams and several salmon rearing lakes in the District, habitat protection has become an enormous responsibility for a limited staff.

Of concern environmentally are over 100 wood-processing manufacturers, six pulp mills (both of the aforementioned require huge harvesting operations), two oil refineries, one smelter, hundreds of placer mine operations, plus agriculture and urban development.

During spring 1982, a CNR derailment near Blue River caused a 227,000 litre spill of ethylene dichloride to enter the North Thompson River. No evidence of damage to the fishery resource was found. Litigation in this matter remains under consideration.

The development of the CNR twin-tracking program adjacent to the Thompson and North Thompson Rivers is a major habitat concern and is being carefully monitored.

Table 4

KAMLOOPS DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	1,261
Forestry	613
Navigable Waters Protection Act	11
Land Use Applications	70
Urban Development	58
Ocean Dumping & Dredging	--
Pollution Control Board:	3
Pesticides	106
Waste Management	80
Highway Development	12
Placer Mining	526
Other	30
Total	2,770

Enforcement

Eighty-four prosecutions were initiated in the District during 1982. Charges ranged from selling salmon not caught commercially, to habitat matters. Fines imposed were noticeably increased from those levied in 1981.

This Department's staff participated in a RCMP roadblock conducted on Highway 1 in Rogers Pass. Five persons were charged under Section 5(2) of the B.C. Fishery (General) Regulations: being in possession of sockeye, pink, or chum salmon taken from nontidal waters of the province.

Salmonid Enhancement

The Quesnel satellite hatchery at Likely is in its first year of production, incubating 1.6 million chinook eggs from the Quesnel River, Blackwater River, Bowron River and Slim Creek. The pilot hatchery at Fort St. James is in its first year of operation, with 77,000 chinook eggs from the Stuart system. A small facility at Penny is in continuing operation with 203,000 chinook eggs from the McGregor River system. Several new pilot projects, at Shuswap Falls, Nicola River and Adams River, are in the planning stages. Construction is planned for the Clearwater pilot project in 1983-84 and construction is now complete at the Eagle River pilot.

The Public Involvement Program is sponsoring 15 projects. The projects involve schools, wildlife clubs and the general public from Blue River to Lillooet and from Prince George to Lumby. These projects are incubating 156,000 coho, 51,000 chinook and 18,000 sockeye eggs. As well as projects, education is stressed in the Interior. Through the projects and the media coverage of the projects, many people are becoming aware of salmonids and their habitat.

The Fish and Wildlife Branch operates the Loon Creek hatchery near Cache Creek. Steelhead eggs and 39,000 chinook eggs are being incubated from the Bonaparte River system.

Contact: Grant Scott,
District Supervisor,
Kamloops.

New Westminster District

The New Westminster District office administers fisheries-related activities in the eastern Gulf of Georgia, Howe Sound, Greater Vancouver, Burrard Inlet, Indian Arm and the Lower Mainland. Included in the District is the Fraser River watershed west of Boston Bar, the Squamish River watershed and the combined watersheds of the Harrison, Lillooet and Birkenhead Rivers. In addition to substantial commercial salmon, crab, shrimp and

prawn fisheries, the District has one of the largest sport fishing fleets found on the coast, with sport fishing activity greatest in Howe Sound and the Strait of Georgia. The District also houses the largest Indian food fishery of the Region (approximately one third of total catches within the Region). Approximately two thirds of the total population of the Province is located within the boundaries of the District, resulting in major and chronic habitat encroachment problems in addition to a substantial amount of illegal poaching and sale of fish. Management and enforcement of the various fisheries and the protection of habitat constitute the major functions of the District.

Commercial Salmon Fishery

The commercial salmon fishery on the Fraser River and District waters of the Gulf of Georgia (Management Area 29) opened in July under the control of the International Pacific Salmon Fisheries Commission. The fishery operated on a 24-hours-per-week basis with 12-hour fisheries occurring when stocks warranted. Two chum salmon fisheries occurred during December, with poor results. The season was highlighted by the large cycle return of Adams River sockeye.

Sport Fishery

The large sport fishing fleet was most active in Howe Sound, Burrard Inlet and the Gulf of Georgia. The Capilano hatchery continues to produce salmon, primarily coho, in numbers that allow for increased sport fishing activity along the north shore of Burrard Inlet. Boundary Bay, Burrard Inlet and Indian Arm are popular recreation areas and support an inten-

Table 5

NEW WESTMINSTER DISTRICT

1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total[1]	Escapement
Statistical Area 28 (Howe Sound-Burrard Inlet)					
Sockeye	0	0	0	0	50
Coho	0	0	0	0	48,100
Chum	0	0	0	0	157,400
Chinook	0	0	0	0	4,700
Steelhead	0	0	0	0	3,800
Total	0	0	0	0	214,050
Statistical Area 29 (Fraser River)					
Sockeye	704,094	0[2]	63,766	767,860	448,500
Coho	15,280	0	75	15,355	42,800
Pink	5	0	0	5	0
Chum	53,685	0	0	53,685	324,200
Chinook	19,505	0	0	19,505	24,000
Steelhead	363	0	0	363	NA*
Total	792,932	0	63,841	856,773	839,500+

* Not available.
1 No commercial salmon fishery in Area 28.
2 No seine fishery.

sive crab fishery for both dungeness and red rock crabs. Catches of smelt by sport fishermen in English Bay have declined in recent years, but the interest and effort in this fishery has not declined. A limited sport fishery is conducted each spring on the stocks of returning eulachons.

Due to manpower shortages and budgetary constraints sport fish catch information was not obtained during 1982.

Fishery officer conducts sport fish licence check in Howe Sound.

Table 6

NEW WESTMINSTER DISTRICT

1982 Sport Fish Catches*

* Statistics not available for 1982.

Indian Food Fishery

A total of 879 Indian food fishing licences, (of which two were Band licences) were issued in 1982, compared to 739 and 671 licences issued in 1981 and 1980 respectively. The Indian food fish catch in 1982, (a non-pink year) increased dramatically to a record

Table 7

NEW WESTMINSTER DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	248,137
Coho	57,089
Pink	0
Chum	19,159
Chinook	30,603
Steelhead	2,018
Total	357,006

357,000 pieces, compared to the previous eight-year average of 210,168 pieces (including pink). The food fishery continues to target on the Early Stuart sockeye, known for their high food quality, and appears to be harvesting a significant number of chinook salmon, 30,600 in 1982, compared to the previous eight-year average catch of 15,700 pieces. Fishing restrictions for conservation purposes are necessary but are difficult to implement.

Indian food fishery on the Capilano River.

Salmon Escapements

Chinook escapement to Lower Fraser streams showed a slight improvement in 1982; however, coho escapements remain below average. Chum escapements were below average resulting in less-than-optimum returns, with the exception of chum in the Alouette River system. A highlight of the season was the record escapement of 290,000 sockeye salmon to Weaver Creek and Weaver Creek spawning channel.

Other Fisheries

The New Westminster District supports an active crab, shrimp and prawn fishery. A large portion of the sales of these species occur over the dock. In addition, fishermen who have previously fished only for salmon have made inquiries into other fisheries, such as zooplankton, crayfish and octopus, in order to further diversify.

Habitat

Habitat encroachment and pollution problems, from industry and urban development, are increasing at an alarming rate in this District, a direct result of the density of the population. This is particularly evident in proposed developments affecting foreshore areas, both fresh and marine waters and the Fraser River estuary, as well as the continued landfill and reclamation along the Fraser River itself. The District continues to pour manpower and resources into habitat protection activities; in some subdistricts, 60 percent of the field officers' time is spent on habitat issues. The District processed 1,430 habitat referrals in 1982, compared to 1,441 in 1981.

Table 8

NEW WESTMINSTER DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	254
Forestry	134
Navigable Waters Protection Act	83
Land Use Applications	120
Urban Development	546
Ocean Dumping & Dredging	58
Pollution Control Board:	10
Pesticides	55
Waste Management	90
Highway Development	16
Placer Mining	18
Other	46
Total	1,430

These sockeye salmon were seized en route across commercial boundary at Clearbrook, B.C.

Enforcement

Enforcement continues to be a major priority within the District. As the price of fish and fish products has increased, the illegal fish "trade" has become more lucrative. Therefore in 1982, in an effort to curb this illegal activity and to try to determine the size of the problem, an undercover "storefront" operation was conducted within the District. This operation concluded after 200 buys (a total of 57,000 kg of salmon). One hundred and thirty individuals were charged with 340 violations, and 54 vehicles were considered for seizure. In addition, the District staff charged 282 persons

with 553 offences. Seizures related to these offences included 398 nets, 23 vehicles, 15 boats and other fishing equipment, 3,370 salmon, 996 crabs, 2 tonnes of clams, 5 tonnes of blackcod and quantities of various other species of fish. One hundred and thirty-three habitat-related offences were investigated, resulting in 41 charges being laid. Many of these cases will not be concluded by the courts until 1983 or 1984. This high violation rate in this District compared to other Districts can be attributed to the large population and the resulting pressures exerted upon the resource by that population.

Salmonid Enhancement

Several enhancement facilities (Chilliwack, Chehalis, Inch Creek, Capilano, Birkenhead) are located within the District. They will provide additional salmon for the user groups when the hatcheries reach production capacity. In addition, several Community Development Projects and numerous Public Involvement (volunteer) Projects are each presently incubating chum and coho eggs ranging from 1,000 to 150,000 eggs. Many of the volunteer projects include stream inventory and clearance work. Two community advisors assigned to the District are kept extremely busy throughout the year with these volunteer projects.

Contact: Don Aurel,
District Supervisor,
New Westminster.

Whitehorse District

The Whitehorse District office is responsible for supervising all river and lake systems in the Yukon and northern B.C.

Management of the commercial, domestic and sport fisheries is the major concern. Habitat protection revolves around mining and proposed hydro dams. A major responsibility (not shared by any other District in the Region) is the management of all freshwater species, including domestic fishing by non-natives. In addition, the District participates in joint U.S./Canada management activities for transboundary river systems. Pipeline proposals, Indian food fishing, mining, road construction, logging, seismic operations, and developments in many fields of the Beaufort Sea make up some of the activities in the Yukon and northern B.C.

Commercial Salmon Fishery

The District had weak runs to all river systems. Dawson City finally had its first fish plant in operation for the 1982 season. Although the plant provided a firm market for the fishermen, strikes in British Columbia and poor markets did not make for good economics for the plant.

The Stikine plant met with similar financial problems when record catches of early sockeye by the Alaska seine fleet reduced the expected Canadian catch drastically. Good coho catches made up for the poor sockeye catch. The Stikine coho catch showed a marked

Table 9

WHITEHORSE DISTRICT

1982 Commercial Salmon Catches*

Species	Catch[1]
Sockeye	18,736
Coho	15,955
Pink	1,984
Chum	12,037
Chinook	10,463
Steelhead	829
Total	60,004

* Escapement figures are not available for this District.

1 All commercial fishing was by gillnet.

increase in quality, due to proper handling and input from the Fish Inspection Division.

The small catch from the Taku River system was flown out to Atlin and then to local markets in the Yukon.

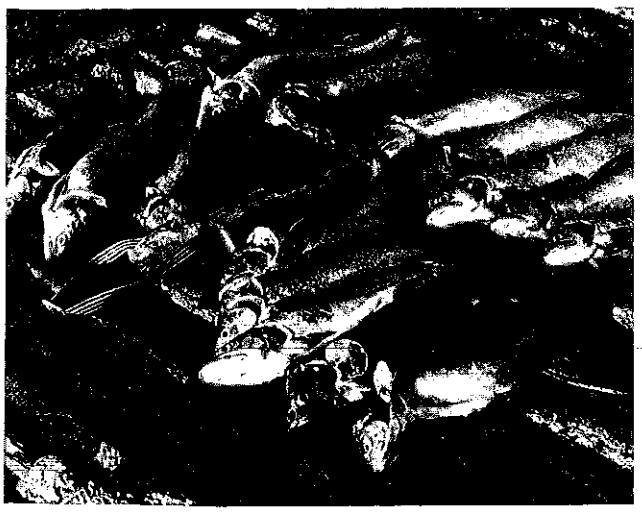
The commercial freshwater fishery, which serves only local markets, is bearing the brunt of blame for the lack of lake trout in certain lakes. The fishery may be forced to concentrate on whitefish stocks.

Sport Fishery

Interest in sport fishing continues to expand both on a commercial vein and growing awareness from the general public.

The final report on productivity of selected lakes will be released in March 1983. It has pointed out the very low productivity of most lakes and the need for immediate action on certain lake trout stocks.

The results have also made for difficult policy decisions on allocation of quotas. The very limited quotas may mean that some user groups would be eliminated from specific lakes.



DFO seized these lake trout which were caught illegally by sport fishermen on Frank and Coghlan Lakes.

Table 10

WHITEHORSE DISTRICT

1982 Sport Fish Catches*

Species	Tidal[1]
Sockeye	360
Chinook	324
Coho	30

* Estimates only.

1 Catch figures are not available for pink, chum and steelhead.

Due to the previous success of pothole lake stocking programs, 20 lakes were stocked with rainbow trout in the spring, and already people are reporting limits of 226-g ($\frac{1}{2}$-pound) trout.

There is no estimate of the chinook catch in the Yukon River system, therefore the estimated catch is down dramatically from 1981. Due to a very poor run of chinook stocks it is estimated the catch would be about a third that of 1981 at best.

The 1981 sport survey is delayed due to computer problems. The lack of data on the freshwater stocks is creating serious management concerns.

Table 11

WHITEHORSE DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	9,948
Coho	40
Pink	60
Chum	4,096
Chinook	8,341
Steelhead	NA*
Total	22,485

* Not available.

Indian Food Fishery

During 1982, there was a concerted effort to obtain much better catch statistics on the Indian food fishery. One COSEP student spent the entire summer issuing licences and picking up catch figures. The result was that licences were issued to many previously unlicenced Indians, and an excellent estimate of catches was recorded.

Salmon Escapements

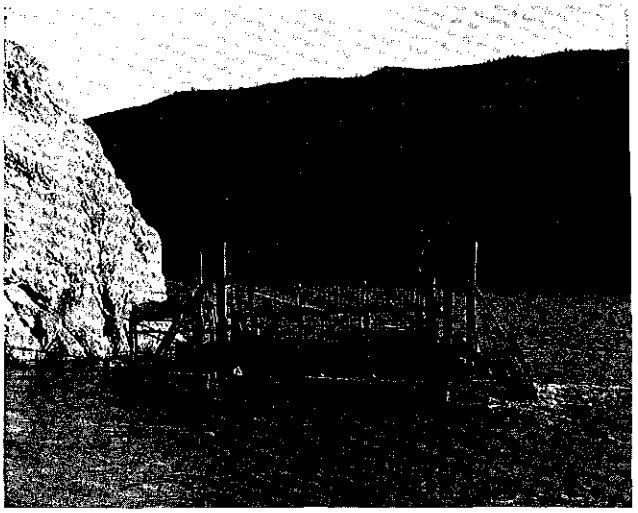
In 1982, chinook stocks on the Yukon River declined dramatically; only 473 adults passed through the fishway at Whitehorse. For the first time, the commercial fishery was cut back for conservation reasons.

The chum run was down from 1981; American catches of summer and fall run chum were only one-half those of the preceding year. The Yukon chum run has been poor in the past few years, with escapement to the Fishing Branch still less than 10,000. The only point of optimism is the glut of chum salmon on the world market, which may decrease fishing effort on the American side.

The Stikine River had a disappointing sockeye return, with only 28,000 counted into Tahltan Lake. The coho escapement was excellent, but heavy fishing may have depleted the stocks.

The Taku River had disappointing sockeye and chinook escapements, even though Canada operated only a token fishery. The coho run appeared improved, but there is no information on the pink and chum salmon stocks.

The Klukshu system was a bright spot, with a record 34,000 sockeye through the counting fence; an estimated 6,000 belonged to the early run. The early run is the major concern because of heavy fishing on the American side and the emphasis of the Indian food fishery on the earlier run fish.



This fishwheel, located approximately 10 km from the Alaska border on the Yukon River, is one of many used in tagging and sampling programs carried out in the Yukon.

Habitat

Gold prices dropped in 1982 to around the $400 mark, setting off a wave of mining collapses. By the end of 1982, the metal market was so bad that there was not a single hard rock mine operating in the Yukon.

Although this was a major calamity to the Yukon economy, it appeared to be an opportunity to establish the new placer guidelines in a calm fashion. Public hearings will be held in 1983 to review the new guidelines.

Gold prices climbed substantially at the end of the 1982 season. It is expected that 1983 will see record applications for water authorizations. One new aspect to the placer industry was that some companies worked over the winter, using tunnels and ore cars to stockpile material for sluicing in the summer.

The recession has put a hold on most power development projects. Although Yukon Electric was issued a water licence, they are not in a rush to commence development unless the Cyprus Anvil mine starts up. The Northern Canada Power Commission (NCPC) will

have completed the fourth turbine installation by late 1983 and there is little speculation on a major project at this point.

The proposed pipeline is, for all intents, a dead issue until there is a drastic rise in the world price of oil and lowered interest rates.

Contact: Gordon Zealand,
District Supervisor,
Whitehorse.

Table 12

WHITEHORSE DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	15
Forestry	40
Navigable Waters Protection Act	1
Land Use Applications	108
Urban Development	0
Ocean Dumping & Dredging	2
Pesticides	1
Waste Management	2
Highway Development	104
Placer Mining	363
Other	21
Total	657

An obstruction to Stikine chinook spawners is removed in Beatty Creek.

Management Biology

The Management Biology Unit undertakes studies and analyses designed to provide a biological basis for managing fisheries. Some programs such as test fishing are primarily of use in managing fisheries in-season, while others such as coded-wire tagging and lake productivity investigations provide information valuable in developing long-term management and enhancement strategies.

Contact: Robin Harrison,
Senior Management Biologist,
Fraser River, Northern B.C.
and Yukon Division.

Fraser River Chinook Test Fishing

A chinook test fishery took place in the Fraser River at Albion for the third consecutive year in order to index the abundance of chinook within the river. A gillnet vessel under charter fished three days per week from April 2 to October 3. Two drifts were made each fishing day during low tide.

Catches were low (between zero and five fish per day) during April, similar to the 1981 pattern, then increased in May, with daily catches ranging from four to 20 fish. In 1981, catches increased briefly in early May, then declined until June. For the remainder of the 1982 season, catches fluctuated between one and 53 chinook per day, with the cumulative monthly indices exceeding those of 1981, except for the month of August. Exceptionally high catches during September reflected a relatively good return of Harrison River chinook. The cumulative seasonal index for 1982 was about 60 percent greater than the 1981 index.

Chinook caught in the test fishery were sampled for length, sex and age. The age composition in 1982 was eight percent age 3, 55 percent age 4, 35 percent age 5 and two percent age 6.

Fraser River Chum Testing Fishing

Test fishing to monitor the abundance of chum salmon in the Fraser River was conducted at two sites in 1982.

One site, at Cottonwood Drift near Tilbury Island, has been used annually since the early 1960s, while the Graveyard Drift site adjacent to Albion has been in use since 1978. Fishing is carried out by commercial fishermen under contract using standard nets and techniques. Two 30-minute drifts were made each day commencing at the lowest tide of the day. Test fishing was undertaken from October 2 to December 10 at Cottonwood and from September 30 to December 17 at Albion.

The seasonal pattern of index values in 1982 was quite similar to that of 1978, the main brood year, although the 1982 values were lower. The relatively low index in 1982, indicating a less than adequate escapement, was subsequently reflected on the spawning grounds.

Fraser River Fry Enumeration

A program to provide an index of fry abundance in the Fraser River during the spring out-migration was conducted again in 1982. The operation was undertaken jointly with the International Pacific Salmon Fisheries Commission (IPSFC), who are primarily interested in the abundance of pink salmon fry. The information is used to calculate egg-to-fry and fry-to-adult survivals and is one factor used in forecasting returns of adults.

The estimated number of pink fry was the highest on record and the abundance of chum fry was well above average. Chinook fry abundance was very low in 1982. This is probably due to the low escapement in 1981 of Harrison River chinook, which are thought to be the main source of the fry enumerated at Mission.

North Thompson and Birkenhead River Coho CWT

Juvenile coho from the North Thompson and Birkenhead Rivers were captured and implanted with coded-wire tags (CWT) in the autumn of 1982. This program was an extension of previous CWT programs on Fraser River coho, which this year included Chilliwack, Salmon (lower Fraser) and upper Pitt River stocks. Tag returns will provide information on the catch distribution, migratory timing, exploitation rates and total abundance of these stocks. Approximately 24,000 coho fry from the North Thompson River watershed (Lion, Wire Cache, Lemieux and Louis Creeks) and 48,000 from the Birkenhead River were tagged and released. These studies were funded through the Job Creation Program.

Harrison River Chinook

The Harrison River, a major tributary of the lower Fraser River, supports a large population of chinook salmon. Escapement enumeration of this stock has always been difficult because of low water clarity and the large size of the spawning area. In 1982, an exploratory program was undertaken to assess several possible methods for obtaining improved escapement estimates. Aerial counting from a helicopter was attempted but was of limited use because of variable water clarity and the intermingling of chum, sockeye and chinook, which made species identification difficult. Visual counts from a drifting boat were also of limited use because of the difficulty in undertaking observations over the large area on a consistent basis. The most encouraging results came from the dead-pitching efforts; a large proportion of the total spawning population was able to be counted by this technique. A mark-recapture program is proposed for 1983 and, if successful, may become the standard method for enumerating this stock.

Fraser River Mainstem Chum

During the 1960s, investigations of Fraser River chum salmon identified

populations spawning in certain side sloughs and channels of the Fraser River. Collectively, these were referred to as "mainstem" chum. Annual identification and enumeration of these populations has received little attention in recent years. In order to improve knowledge of the mainstem chum, an exploratory program was undertaken in the fall of 1982. The field crew examined all known spawning areas and investigated other areas that appeared potentially capable of supporting chum salmon spawners. Very few chum were actually observed in most mainstem areas with the exception of Wahleach Slough. All chum were observed in areas of groundwater seepage. Futher work is required to develop a more consistent method of enumerating mainstem chum on an annual basis.

Fraser River Creel Census

A creel sensus was undertaken on the bars of the lower Fraser River in order to provide estimates of effort and catches and angler distribution. Virtually all of the known fishing sites were visited from September to December, and more than 3,200 interviews were conducted. Catches were relatively low, with coho, cutthroat trout, chinook and rainbow trout being most common, in descending order of importance. If funding permits, an expanded program is planned for spring 1983. The 1982 census was funded through the Job Creation Program.

Fraser River Experimental Sockeye Sport Fishery

A triangular-shaped area off the Fraser River is currently closed to sport fishing for salmon as a conservation measure for chinook. The sport fishing ban has been criticized as being too restrictive, and several alternatives have been suggested, including the limiting of fishing to sockeye and pink salmon only. Before this suggestion could be considered, a technique had to be developed for catching sockeye and pink specifically without affecting other salmon species (as "shakers"--undersized fish--or as legal-sized fish).

In September 1982, a small exploratory program was set up with the basic objective of developing angling techniques for sockeye. The program was developed and undertaken with the assistance of volunteer sport fishermen. Fishing was conducted on two Saturdays at sites located between the North Arm and Tsawwassen. Commercial pink and red hoochies were the main lures used and these were compared with standard "coho lures."

The results confirmed the high juvenile shaker rate in this area during September. The pink and red hoochies used were not specific for sockeye, as both shakers and legal-sized chinook and coho were taken on them. Shakers were caught throughout the study area from the North Arm to Tsawwassen.

Sockeye were caught, although in relatively small numbers, considering their abundance. While the program was small in scope, results do indicate that the lures tested were not specific for sockeye.

Crab Soft Shell Monitoring

A program initiated in 1981 to monitor the incidence of soft shell in Dungeness crabs continued in 1982. Soft shell describes the condition of crabs after they have moulted. During this period, the undersized crabs can be easily injured, the meat is generally of low quality and the meat recovery rate is low.

The objective of the program is to identify when the majority of crabs in the Fraser River area have soft shells and then close the fishery during this period. The program was conducted between February 4 and June 21. Sample sites were located on Roberts and Sturgeon Banks in Boundary Bay and in Burrard Inlet. Crabs were sampled for size, sex and hardness of the shell,

and on one occasion, the average meat recovery rate for soft and hard crabs delivered to a processor was determined.

The incidence of soft-shell crabs increased, first in the Burrard Inlet area, followed approximately one month later by Roberts and Sturgeon Banks and Boundary Bay. In Burrard Inlet, the incidence of soft shell among sampled legal-sized crabs increased from approximately 47 percent on April 5 to 68 percent on April 21. The incidence of soft shell on Roberts and Sturgeon Banks and Boundary Bay did not exceed 50 percent until the last week of May. On June 21, the last sampling date, the incidence of soft shell on Roberts Bank still exceeded 50 percent. The meat recovery rate of crabs sampled at a processor on June 17 and 18 averaged approximately 17 percent for soft-shelled crabs and between 19 and 23 percent for hard-shelled crabs. On those dates, approximately 80 percent of the crabs delivered to the processor were considered to be soft shelled.

Unfortunately, the annual closure of May 15 to June 15 could not be varied and consequently results of the monitoring program were not used to regulate the 1982 fishery.

Klukshu Salmon Enumeration

This year marked the seventh consecutive year the Department has operated a counting weir on the Klukshu River in southwest Yukon Territory. This small stream, probably the most productive in the entire Alsek drainage, is the site of the most intensive sport and native food fisheries in the Yukon. The objectives of the 1982 program were: to enumerate the chinook, sockeye and coho returns to the system prior to October 15; to sample a portion of the catch (both sport and food fishing), for baseline bio-statistics; to obtain a rough estimate of the total harvest.

The counting weir was in operation from May 28 to October 22; 2,369 chinook, 33,699 sockeye (new record), and 189 coho were counted. In addition, about 800 samples were obtained from the various fisheries. Estimates of the total Canadian catch were 300 chinook, 5,500 sockeye and 100 coho.

Tahltan Lake Counting Fence and Stikine River Sampling

A counting fence at the outlet of Tahltan Lake in the Stikine River system has been operated for 24 consecutive years. The objectives of the 1982 program were to: enumerate returning sockeye adults; collect baseline biological information from the escapement; and collect some baseline limnological data on Tahltan Lake which might be useful in a proposed lake enrichment program.

A total of 28,263 sockeye were counted during the period of migration from July 11 to the end of August. Approximately 1,500 of these fish were live-sampled for length, sex and age. In addition, 301 chinook were counted during regular stream walks from the lake downstream over a distance of about 7.5 kilometres. Three coho were also counted through the weir towards the end of the program.

The limnological data are still being analysed, but preliminary results suggest the lake to be an excellent candidate for lake enrichment.

Approximately 2,100 salmon caught in the lower Stikine River commercial fishery and 500 taken in the upper river fishery in the vicinity of Telegraph Creek were sampled for length, sex and age in 1982. These data will assist in the future management of these stocks.

Field work at Tahltan and on the Stikine was performed by participants in COSEP (Career Oriented Student Employment Program) and Summer Canada Employment Program.

1982 Aquaculture Program

From the early 1970s to 1977, the

Department was engaged in an aquaculture program which undertook to stock rainbow trout and/or coho salmon in several pothole lakes within close proximity to various population centers. However, this very popular program was suspended in 1978 when more stringent fish health regulations eliminated the donation of fish from various federal fish hatcheries throughout B.C. In 1982, the Salmonid Enhancement Program (SEP) funded the aquaculture program.

The primary objective for the stocking of pothole lakes is the provision of readily accessible year-round sportfishing opportunities which may help to relieve pressure on heavily exploited wild stocks. Indications that this objective was being reached came from the results of an aquaculture questionnaire circulated in 1980, which determined that 2,431 Yukoners fished in one or more of the stocked lakes for a total of 15,444 person-days (representing approximately ten percent of total fishing effort of resident anglers). However, with the last stocking taking place in 1977, the quality/success of fishing these lakes gradually deteriorated.

In June 1982, 117,000 rainbow trout fry purchased from a commercial fish farm in B.C. were released into twenty pothole lakes located from near Watson Lake to north of Elsa.

Preliminary information suggests that the 1982 stocking will be successful. In a follow-up sampling program to determine growth rates and relative abundance, rainbow weighing in excess of 0.5 kg have been caught. Several reports from the public have also been received relating stories of excellent fishing.

Yukon Lake Productivity Survey

In 1981, a program designed to estimate basic levels of productivity in Yukon lakes was initiated in order to provide a biological basis for establishing fishing regulations. The morphoedaphic index (a relationship between total dissolved solids and mean depth) was selected as the measure of productivity and this was determined for 52 lakes. The program was continued in 1982 as part of the Yukon River Basin Study, and an additional 17 lakes were sampled. Ten of these lakes were examined for fish species composition.

The major objective of the lake productivity program is to develop fish harvest quotas (primarily for lake trout) which will reflect the relative productivity of specific water bodies. The morphoedaphic index will provide basic fish production yields, whereas the species composition work will indicate how that yield should be partitioned. Once these data are determined, harvests by sport, commercial, domestic and subsistence fishermen will be monitored to ensure that lakes are not exploited beyond their productive potential.

The results of the program to date indicate that, in general, fish production in Yukon lakes is low. Extremely slow growth rates have been determined for lake trout, and severe size overlap occurs between different age classes. It is becoming apparent that a low yield policy should be instituted for this species in order to perpetuate the good fishing in the Yukon's relatively underexploited lakes.

Results from the species composition work show the following average distribution-by-weight in the catch: 42.4 percent lake whitefish, 22.4 percent pike, 20.9 percent lake trout. The remaining 14.3 percent is composed of species such as: round whitefish, least cisco, Arctic grayling, longnose suckers, burbot, etc.

Yukon River Chinook and Chum Salmon Spaghetti Tagging and Sampling Program

In 1982, a chinook and chum tagging program was conducted in the Yukon River in order to estimate populations, exploitation rates, migration timing

and rate of travel. Using two fishwheels and small-mesh gillnets, 265 chinook and 1,082 chum salmon were caught, sampled, spaghetti-tagged and released in an area just inside the U.S.-Canada border, approximately 200 km downstream from Dawson. Tag recovery information and tag:untagged ratios in the catch were used to calculate population estimates.

Escapements to upper Canadian Yukon tributaries were then calculated by subtracting the total Canadian catches, which were approximately 17,000 chinook and 15,000 chum. The exploitation rate in the Canadian commercial fishery was 34 percent for chinook and 26 percent for chum. The length-weight-age and sex statistics gathered from chinook in the commercial catch and on the spawning grounds, when compared to similar measurements for fish caught in the fishwheels, indicate a sampling bias towards the capture of smaller males by fishwheels.

Yukon River Radio Tagging Program

In conjunction with the spaghetti tagging program, a two-year radio tagging study will provide information on migratory behavior, residency time in the commercial fishery, spawning distribution and stock separation of Yukon River chum and chinook salmon.

In 1982, 114 chum salmon were implanted with radio tags and released. By using 50 different frequencies and variable pulse rates, individual fish could be separated by the radio trackers. A Cessna 185 equipped with two independent receivers and antennae systems tracked the fish daily. Some of the tags were recovered by ground crews operating from boats or on foot.

Of the 114 radio tags applied, 68 were tracked to various tributaries and spawning grounds. Principal spawning areas identified were the Kluane-White River system, the mainstem Yukon and upper Yukon-Teslin system. Twenty-seven radio tags were recaptured by fishermen, thirteen tags were believed to be either regurgitated or the fish died, and six transmitters were either lost or failed.

The greatest tracking distance was 800 km over a period of 34 days. The average migration rate was 37.9 km/day (max. 50.9 km/day), which is significantly higher than migration rates reported from other Yukon River tagging studies. This figure indicates that chum salmon would require an average of 4.2 days to migrate through the 160 km commercial fishing zone. Noted behavioral changes in migration patterns included increased bank orientation in the mainstem Yukon as fish approached the destination-tributary and variable migration rates from one tributary to the next.

In spite of the extreme water turbidity and the extensive area to cover, no major problems were encountered. Plans are to continue the project in 1983 with chinook salmon.

Yukon River Escapement Surveys

The Whitehorse fishway has been passing chinook salmon around the NCPC dam since 1959. By 1976, when only 121 fish were counted, it looked as if the run was heading into extinction. However, during the past half decade, escapement increased significantly, to a peak of 1,555 in 1981. Unfortunately, the escapement was dramatically smaller this year, with only 473 counted past the fishway.

The poor showing of chinook this year at Whitehorse was also reflected in very poor counts from other tributaries. In all of the dozen or so tributaries floated or flown for escapement estimates, the number of spawners seen was significantly less than normal. An extremely high Japanese highseas catch in 1980 and comparatively high Alaskan catch in 1982 are thought to have greatly contributed to the low numbers returning to Canada in 1982.

Southern Inspection District

The Fraser River, Northern B.C. and Yukon Inspection District contains 83 federally registered fish plants, of which 38 are registered to handle bivalve shellfish (compared to 80 and 37 respectively, for 1981). These figures include eight shellfish plants located on the Sechelt Coast, which is nominally in South Coast Division area, but is monitored for convenience by Vancouver staff.

There has been a continuing trend for small, ostensibly specialty plants to apply for registration. These tend not to remain specialty plants, but expand, and therefore begin to occupy increasing portions of DFO staff time. In addition, two new "P" licence vessels (processing at sea) and the "Callistratus" deliver to Vancouver plants. These vessels require sampling and inspection like shore-based facilities.

Cannery Inspections

In late April 1982, the botulism case in Belgium involving U.S.A. canned salmon and a subsequent false alarm in Britain had a devastating effect on Canada's canned salmon markets and hence, on the salmon canning industry. In order to restore confidence in the integrity of Canada's canned product, there was a complete restructuring of the cannery surveillance program. In addition to the ongoing sampling and inspection by the canned fish laboratory, and the surveillance of the canning operations by the District field staff, mechanical screening (double dud detector/weight checker) and/or hand culling of B.C. canned salmon was made mandatory for every lot.

Almost all of the screening now required by the program takes place in this District (87 percent of the pack) since much of the canned product from North Coast and South Coast Districts is transhipped for labelling/warehousing in Vancouver. The culling operations of five labelling/screening warehouses are monitored in this District. Furthermore, all USA canned salmon import shipments must also be mechanically screened and/or hand culled. This program has involved an in-depth analysis of canning lines, development of policies and techniques in the event that defective cans were found and long hours of supervising culling operations for questionable lots. Roughly 500,000 48-lb cases of B.C. canned salmon were packed here.

Product Certification

The field staff has continued to be flooded by industry with requests for Certificates of Inspection for the exporting of fish products. In addition to being a regulatory mandate to issue these certificates on request, the Inspection Branch also provides the industry with a vital service where:

- certificates are a regulatory requirement of the importing country
- certificates are a necessary document for letters of credit in the trading function
- they are a regulatory requirement for the export of some restricted products (i.e. frozen sockeye and pink salmon, herring spawn-on-kelp).

In 1982, because of the weak market for canned salmon, a dramatic increase of frozen salmon production, especially sockeye salmon, resulted in a 57 percent increase in shipments inspected. There were 18.0 million kilograms examined.

It should be noted that much of the frozen product from North Coast and South Coast Districts is also transferred to Vancouver for reshipping to export markets. Much of this product is inspected in the other districts, but it is still monitored and certified through this District office. There were 2,886 Inspection Certificates issued through the Vancouver office.

Plant Inspection Activities

All plants in this District are surveyed at least once during the year for the purposes of maintaining their Certificates of Registration. Surveys are a means of determining whether the plant meets the operational and constructional standards of the Fish Inspection Regulations, or in essence, whether the processor is conforming to good manufacturing practices.

Product quality and sanitation is also monitored on a continual basis. Much of the clam harvest in southern waters passes through Vancouver plants for distribution, and it is sampled here. Appropriate working arrangements have been made with several remote plants for sampling their products locally. Surveillance of the clam fishery resulted in closures for PSP blooms in several statistical areas. The illegal trade in untested clams was stopped when retail outlets were canvassed.

The 1982 roe herring fishery became increasingly routine, with departures from good commercial practices being recognized promptly before quality losses occurred.

The food herring catch was reduced with the imposition of a quota of 45 tonnes per vessel, one vessel per plant. There was an improvement in product quality, but improvements were still somewhat marginal. Poor markets, coupled with poor fishermen and processor attitudes resulted in warm deliveries and delayed processing. Many lots were denied product certification, while some were designated bait. With imposed quotas, it was hoped these problems would be minimal.

The Stikine sockeye and Yukon River chum/chinook fisheries were also monitored. There is an increasing interest in these areas to do secondary processing.

1983 Prospects

The long-awaited Quality Improvement Program will be implemented in 1983. Elements of this initiative are expected to include:

- implementation of final product quality grade standards for salmon, groundfish and food herring, on a one-year voluntary basis
- major modification to the vessel inspection program
- formal introduction of quality control program requirements to industry
- development of dockside grading requirements
- implementation of a plant rating system
- surveillance of unloading sites, other than registered plants, and inspection of transport vehicles.

Contact: C. Dale Paterson,
District Inspection
Supervisor,
Vancouver.

South Coast

This year can probably be best described as a trying year for all concerned. Faced with a sagging economy, budget cuts, inadequate or outdated biological data and regulations, and International Treaty negotiations, the management of most fisheries was extremely difficult. Major changes in diversion rates and unexpected abundances of salmon only intensified the competition amongst the user groups. The Pearse Report was on everybody's mind--while many fishermen saw it as another threat to their survival, Departmental staff hoped that it may provide some salvation.

Decentralization continued in 1982, with the arrival of three habitat management staff in Nanaimo; they will be joined by five more in early 1983. The addition of this strengthened capability in the South Coast Division should go a long way in preserving the multitude of fish habitats which are being threatened.

On a more positive note, these difficulties have proved to be the catalyst to promote the fusing together of fishery officers, office support staff, biologists, technicians, inspection staff, scientists, ship's crews and seasonal staff and fishermen, all with one goal in mind: the preservation of the fisheries resource. A multidisciplined team is developing, and the combined efforts can only enhance the Division's abilities to resolve the complex issues of 1983.

Contact: Dennis Brock,
Area Manager,
South Coast Division,
Nanaimo.

Nanaimo District

This District is responsible for that portion of the Strait of Georgia from Shelter Point on the east coast of Vancouver Island just south of Campbell River to Saanich Inlet, and from Toba Inlet to Howe Sound on the mainland. There are six subdistrict offices, located at Comox, Qualicum Beach, Nanaimo, Duncan, Madeira Park (Pender Harbor), and Powell River. The major fishing activities in this District include shellfish, salmonids, herring and groundfish harvested by commercial, recreational and native fishermen.

A 36-member crew on a job creation project greatly assisted officers in the Cowichan subdistrict in stream enumerations, fry salvage and natural enhancement projects.

Commercial Salmon Fishery

There was a catch of 130,658 Fraser River sockeye by seine and gillnet during the Sabine Channel fishery, which lasted six weeks. An expected bumper return of chum to the Big Qualicum resulted in six gillnet fisheries and one seine and gillnet fishery. The total catch was 7,535 coho, 278,577 chum and 403 chinook. The fall chum gillnet fishery in Area 17 took 46,250 chum over a four-week period. A small gillnet fishery was conducted in Satellite Channel--the first since 1973. The troll fishery was light in lower Georgia Strait.

The District sold 3,226 one-year personal commercial fishing licences in 1982 and 220 five-year licences for a total of 3,446 licences, up slightly from 1981. Three tuna licences were also sold.

Table 13

NANAIMO DISTRICT

1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 14S (Parksville-Qualicum)					
Sockeye	0	0	475	745	38
Coho	7,160	375	9,436	16,971	42,094
Pink	0	0	20	20	0
Chum	103,475	175,102	11	278,588	202,718
Chinook	293	100	7,360	7,753	4,512
Steelhead	0	0	0	0	0
Total	110,928	175,577	17,572	304,077	249,362
Statistical Area 14N (Comox)					
Sockeye	0	0	0	0	0
Coho	0	0	0	0	33,180
Pink	0	0	0	0	1,093
Chum	0	0	0	0	71,421
Chinook	0	0	0	0	2,340
Steelhead	0	0	0	0	300
Total	0	0	0	0	103,334
Statistical Area 15 (Powell River)					
Sockeye	0	0	0	0	0
Coho	0	0	0	0	2,054
Pink	0	0	0	0	0
Chum	0	0	0	0	30,800
Chinook	0	0	0	0	2,052
Steelhead	0	0	0	0	0
Total	0	0	0	0	34,906
Statistical Area 16 (Pender Harbour)					
Sockeye	5,196	125,462	0	130,658	3,400
Coho	82	3,228	0	3,310	2,023
Pink	1	0	0	1	0
Chum	3	81	0	84	34,225
Chinook	35	1,168	0	1,203	0
Steelhead	0	0	0	0	0
Total	5,317	225,401	0	135,256	39,648
Statistical Area 17 (Nanaimo)					
Sockeye	0	0	0	0	11
Coho	1,305	0	0	1,305	7,908
Pink	0	0	0	0	0
Chum	46,798	0	0	46,798	102,000
Chinook	84	0	0	84	2,335
Steelhead	0	0	0	0	0
Total	48,187	0	0	48,187	112,254

Table 13, Contd
NANAIMO DISTRICT

1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 18 (Cowichan)					
Sockeye	0	0	0	0	0
Coho	115	0	0	115	30,000
Pink	0	0	0	0	0
Chum	6,150	0	0	6,150	110,000
Chinook	50	0	0	50	4,500
Steelhead	0	0	0	0	0
Total	6,315	0	0	6,315	144,500

Sport Fishery

Sport salmon fishing continued to decline in 1982. The downturn in the economy affected both tourism and sport fishing. The Department, aided by summer students, continued to conduct a survey by aircraft overflights and fishermen interviews. Long-term, extensive, paralytic shellfish poisoning conditions persisted in the Strait of Georgia, resulting in widespread closures. Areas 14 and 18 were not affected.

Table 14

NANAIMO DISTRICT

1982 Sport Fish Catches*

* Statistics are not available for 1982.

Indian Food Fishery

A fisheries river management course was initiated by the Cowichan Indian Band. Band members who took the course made numerous patrols of the Cowichan River on their own and in conjunction with the local fishery officers. Openings and closures of the Indian food fishery were administered through the band. A purse seine fishery was organized for the Nanaimo Indian Band. In the Powell River area, the Indian food fishery near Sliammon and Okeover Creeks resulted in a combined catch of approximately 8,000 chum and 1,000 coho. Puntledge hatchery provided 1,500 chum carcasses to the Comox Indian Reserve

In the Qualicum-Parksville subdistrict, the Indian food fishery was almost completely satisfied by removing surplus fish directly from the big Qualicum hatchery. These fish (26,200 coho and 5,967 chum) were supplemented by a catch of 4,755 chum from a test fishery.

In 1982, a new method of distribution was proposed and implemented. In

Table 15

NANAIMO DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	346
Coho	32,927
Pink	15
Chum	22,072
Chinook	2,735
Steelhead	22
Total	58,117

the past, representatives of Southern Vancouver Island bands took delivery of fish at the hatchery and transported them by vehicle to the various Vancouver Island destinations. This year, the bulk of the fish removed from the hatchery was transported to Kingfisher Enterprises, a local processing plant in Coombs, where they were processed, frozen, and stored. Pickup and transportation of Indian food fish by the Island bands then originated from Kingfisher.

Salmon Escapements

The total 1982 salmon escapements was comparable to that of 1981. Area 14N experienced a very low return of fall chinook and pink salmon. Two salmonid enhancement projects on Beach and Craig Creeks expecting their first returns were not disappointed--both creeks received better than expected escapements. A new SEP project was started on French Creek. Escapement of chinook to the Toba system was excellent in 1982. Chum escapements were low in Areas 15 and 18.

Herring Fishery

In a 12-hour seine fishery in Pylades Channel, only half of the projected quota, approximately 3,500 tonnes, was taken. An extension in Area 14, upper Georgia Strait, was required to reach the gillnet quota. The Lambert Channel area had two successful openings.

Trincomali Channel was the scene of the bulk of the food and bait herring fishery in the gulf, with 29 vessels participating.

Of the five roe-on-kelp licences issued in the District, two operated outside the District, two in the Ladysmith Harbor area and one at Lund. One operation out of Knight Inlet went over its quota of 7 tonnes (16,000 lbs), and the others did not reach their quotas. The total combined production processed was 29.16 tonnes.

Table 16

NANAIMO DISTRICT

1982 Herring Spawn Deposition*

(standard square metres x 1,000)

Area	1982	1981
14	6,229.67	2,205.83
15	1,235.43	848.98
16	10.80	0.44
17	2,174.35	1,085.64
18	37.35	114.08

* The 1981 figures in this table are the final data compiled by the Field Services Branch; they do not in all cases correspond with the data published in the 1981 FSB Review.

Table 17

NANAIMO DISTRICT

1982 Commercial Herring Catch (tonnes)

	Total[1]
Statistical Area 14N (Comox)	
Food & Bait	0
Roe	6,656.1
Statistical Area 17-2,17-3, 17-4 (Nanaimo-Ladysmith)	
Food & Bait	1,485.3
Roe	3,809.0

[1] All herring fisheries were by seine in this District.

Other Fisheries

Probably due to the recession, commercial clam digging attracted an increased number of people. Approximately 75 percent of the District's oyster production came from the Comox area, the shellfish fishery being a major commercial source of income for many fishermen in this area. Mid-water trawl vessels visited the Powell River region in search of hake and pollock.

Other major commercial fisheries in the District include the groundfish trawl fishery for sole, grey cod, dogfish, rock fish, lingcod, skate and flounder. Prawns, shrimp, crab, geoducks and sea urchins are landed in various quantities throughout the Georgia Strait.

Habitat

Not much activity took place in the District, due to a slowdown in the economy. The British Columbia Logging Order came into effect in 1982 for Cowichan Bay; however, the application of this legislation is still under consideration.

The dumping of garbage on Texada Island by the Greater Vancouver Regional District was the cause of great concern to the islanders. The decision was successfully reversed.

Increasing interest in the interior of 14S (Coombs-Errington), by developers has drawn closer attention to the sensitive environmental aspects of the marshy conditions and given rise to new approaches undertaken to protect them.

Some large-scale projects occurring in the Comox region included the Regional District of Comox-Strathcona sewerage system from Cape Lazo to the Courtenay River, the Regional District's water system expansion affecting the Puntledge and Tsolum Rivers, and modifications to the Comox Lake hydro dam. Proposals causing significant fishery concerns are the Parksville to Campbell River highway bypass, construction of the natural gas pipeline, coal mining in the Trent, Washer and Tsolum River systems and construction of barge loading facilities at Royston. A concrete spill in Wakefield Creek resulted in charges being laid against the Department of Highways. The number of referrals decreased from 819 in 1981 to 681 in 1982, a decrease of 17 percent.

Table 18
NANAIMO DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	167
Forestry	86
Navigable Waters Protection Act	72
Land Use Applications	191
Urban Development	104
Ocean Dumping & Dredging	5
Pollution Control Board:	
Pesticides	27
Waste Management	24
Highway Development	5
Placer Mining	0
Other	0
Total	681

Enforcement

The number of charges laid was 162, and 117 of these resulted in convictions. The most common violation in both the commercial and sport fisheries was for not having the appropriate personal licence.

Salmonid Enhancement

District staff continue to be involved with SEP community advisors on many small projects as well as the larger community development projects at Cowichan, Nanaimo, Sechelt and Sliammon Rivers. Public response to all these projects has been excellent. New projects begun on French, Craig and Beach Creeks in the Parksville/Qualicum area are showing promising signs for the future.

The Sunshine Coast/Powell River area acquired a resident community advisor in late 1982, and his presence is already showing a positive influence in the community. He can be contacted in the Pender Harbor office.

Contact: Kip Slater,
District Supervisor,
Nanaimo.

Port Alberni District

The Port Alberni District office supervises fishing and other related environmental matters for the west coast of Vancouver Island. Subdistrict offices are located in Tofino, Tahsis and Port Hardy.

Commercial Salmon Fishery

Again, as in past years, there was a large commercial gillnet and seine sockeye salmon fishery in Barkley Sound and Alberni Inlet (Area 23). This year, the management of the fishery was changed. The gillnet fleet operated in Barkley Sound; the purse seines in the waters of Alberni Inlet. This procedure reduced the seine incidental catch of chinook salmon from an average of 10,000 pieces per season since 1973 to 100 only this season. Following this June-July fishery, Alberni Inlet was opened for a chinook gillnet fishery, where a record catch of 42,000 pieces was harvested. In October, a chum salmon gillnet and seine fishery in Areas 24-25 and 26 produced a very good catch of high quality chum salmon.

Table 19

PORT ALBERNI DISTRICT

1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 22 (Nitinat Lake)					
Sockeye	0	0	0	0	40,000
Coho	0	0	0	0	7,000
Pink	0	0	0	0	0
Chum	0	0	0	0	30,000
Chinook	0	0	0	0	2,000
Steelhead	0	0	0	0	200
Total	0	0	0	0	79,200
Statistical Area 23 (Barkley Sound)					
Sockeye	189,421	220,245	0	410,025	440,140
Coho	549	13	0	562	21,000
Pink	1	0	0	1	0
Chum	195	1	0	196	135,000
Chinook	42,698	48	0	42,746	17,636[1]
Steelhead	94	2	0	96	NA*
Total	234,357	220,369	0	454,726	613,776
Statistical Area 24 (Clayoquot Sound)					
Sockeye	0	0	0	0	90,000
Coho	0	100	0	100	4,000
Pink	0	0	0	0	2,500
Chum	3,800	18,600	0	22,400	75,000
Chinook	0	300	0	300	700
Steelhead	0	0	0	0	NA
Total	3,800	19,000	0	22,800	172,200

Table 19, Contd
PORT ALBERNI DISTRICT

1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 25 (Nootka Sound)					
Sockeye	0	0	0	0	2,200
Coho	0	0	0	0	5,610
Pink	0	0	0	0	17,000
Chum	91,715	122,854	0	236,734	164,000
Chinook	0	0	0	0	1,855
Steelhead	0	0	0	0	NA
Total	91,715	122,854	0	236,734	190,665
Statistical Area 26 (Kyuquot Sound)					
Sockeye	0	0	0	0	7,000
Coho	0	0	0	0	750
Pink	0	0	0	0	2,500
Chum	30,000	291,337	0	321,337	91,200
Chinook	0	0	0	0	1,010
Steelhead	0	0	0	0	NA
Total	30,000	291,337	0	321,337	102,460
Statistical Area 27 (Quatsino Sound)					
Sockeye	0	0	0	0	1,000
Coho	0	0	0	0	5,562
Pink	0	0	0	0	5,530
Chum	0	0	0	0	78,110
Chinook	0	0	0	0	5,562
Steelhead	0	0	0	0	5,000
Total	0	0	0	0	100,764

* Not available. [1] Wild stock.

Sport Fishery

As in past seasons, the majority of the effort took place in Area 23, where a record of effort and catch took place. During late July to early September, the chinook catch in Alberni Inlet was excellent. Port Alberni is now the self-proclaimed "Salmon Capital of the World."

Table 20
PORT ALBERNI DISTRICT

1982 Sport Fish Catches*

Species	Tidal	Nontidal
Sockeye	3,090	0
Coho	6,500	0
Pink	2,575	0
Chum	800	0
Chinook	18,200	0
Steelhead	NA[1]	NA

* Estimates only.
[1] Not available.

Indian Food Fishery

This season's increase in chum and chinook salmon resulted in more fishing effort and subsequently a 100 percent increase in the sockeye catch and a 50 percent increase in the chinook catch. Ninety percent of the District's activity takes place in and near Port Alberni. The remaining effort is in Area 24 and Area 25.

Salmon Escapements

The 1982 escapement of Sproat Lake sockeye--215,000 pieces--was very good and the 170,000 escapement to Great Central Lake was fair. Chum escapements varied throughout the District, ranging from poor to Nitinat Lake, low in Quatsino Sound, adequate in Barkley and Clayoquot Sounds, to good in Nootka and Kyoquot Sounds. There were good returns of chinook to enhanced systems and less than adequate in systems producing wild chinook.

Herring Fishery

Again in 1982, herring stocks declined slightly, despite lower roe herring catches. Area licencing has proved its worth, but increased effort by District staff was necessary to achieve a desired catch and escapement balance.

Other Fisheries

In this District, there are fisheries for geoducks, shrimp and prawns, abalone, lingcod and various bottom fish.

Habitat

This function is one of high priority in this District, accounting for about 60 percent of staff time. Despite a decline in forestry-oriented production, the planning and referral process continued.

The Meares Island and Tahsish River Task Force studies, set up to determine a best use management policy, are nearing completion. Meares Island, located east of Tofino, has been under examination for possible logging activities.

Table 21

PORT ALBERNI DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	67,000
Coho	2,200
Pink	25
Chum	5,000
Chinook	18,500
Steelhead	1,200
Total	93,925

Table 22

PORT ALBERNI DISTRICT

1982 Commercial Herring Catch (tonnes)

	Seine	Gillnet	Total[1]
Statistical Area 23 (Barkley Sound)			
Food & Bait	0	0	0
Roe	3,385	0	3,385
Statistical Area 24 (Clayoquot Sound)			
Food & Bait	0	0	0
Roe	700	885	1,585
Statistical Area 25 (Nootka Sound)			
Food & Bait	0	0	0
Roe	0	0	0
Statistical Area 25 (Esperanza Inlet)			
Food & Bait	0	0	0
Roe	0	2,100	2,100
Statistical Area 26 (Kyuquot Sound)			
Food & Bait	0	0	0
Roe	0	0	0
Statistical Area 27 (Quatsino Sound)			
Food & Bait	0	0	0
Roe	325	400	725

[1] There were no trawl fisheries in this District.

Table 23

PORT ALBERNI DISTRICT

1982 Herring Spawn Deposition*

(standard square metres x 1,000)

Area	1982	1981
21	--[1]	--
22	--[2]	--
23	291.93	426.42
24	168.66	1,792.94
25	720.49	625.80
26	NA	NA
27	722.32[3]	1,173.12

* The 1981 figures in this table are the final data compiled by the Field Services Branch; they do not in all cases correspond with the data published in the 1981 FSB Review.

1 There is no herring spawning in Area 21.

2 Area 22 is Nitinat Lake; no herring spawning takes place.

3 Area 27 figure does not include Klashkish Inlet, as there was no estimate of Bare area or egg densities available.

Table 24

PORT ALBERNI DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	30
Forestry	175
Navigable Waters Protection Act	10
Land Use Applications	100
Urban Development	30
Ocean Dumping & Dredging	8
Pollution Control Board:	
Pesticides	50
Waste Management	30
Highway Development	0
Placer Mining	0
Other	100
Total	533

Enforcement

This District had a total 84 charges, resulting in 53 convictions during the year. The majority of the season's enforcement effort was spent during the sockeye net fishery in Area 23. The FPV Atlin Post and night-operated aircraft assisted with boundary enforcement for the five-week fishery.

Other enforcement effort took place on habitat violations, sport fishery violations and illegal sales of salmon.

Salmonid Enhancement

The three salmonid enhancement facilities, at Conuma, Robertson Creek and Nitinat Lake, are in full production. The effects of the Robertson Creek facility have been felt for a number of years. The large return of hatchery-produced chinook salmon are harvested commercially as well as by the sport fleet and by native Indians.

The artificial fertilization program for sockeye enhancement at Great Central Lake continues and has well proved its worth.

SEP's community advisor was busy with various groups, schools, etc. on small, but nevertheless important projects.

Contact: Don McCulloch,
District Supervisor,
Port Alberni.

Campbell River District

This District, composed mainly of sheltered waters, is extremely mountainous, with extensive ice fields at headwaters of some of the mainland river systems. Climatic conditions vary considerably throughout the District, with the coastal areas being relatively mild and wet, while the heads of the mainland inlets experience greater extremes in temperature and heavy snowfall. The District manages the largest multiple-use area in Pacific Region, with more than 103,600 sq km from Campbell River to Cape Scott, with subdistricts at Port Hardy, Alert Bay and Campbell River. The Campbell River District has 127 spawning streams, extensive logging and mining interests, and a large commercial and sport fishery.

Table 25

CAMPBELL RIVER DISTRICT

1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 11 (Port Hardy)					
Sockeye	12,505	0	13,248	25,753	0
Coho	4,581	0	81,077	85,658	1,400
Pink	2,109	0	5,830	7,939	0
Chum	20,200	0	2,351	23,451	59,087
Chinook	525	0	12,194	12,876	0
Steelhead	55	0	0	55	0
Total	39,975	0	114,700	155,732	60,487
Statistical Area 12 (Alert Bay)					
Sockeye	190,246	824,806	862	1,015,914	63,760
Coho	39,791	72,737	5,619	118,147	2,500
Pink	6,249	97,007	1,580	104,836	432,475
Chum	185,968	593,921	37	779,926	135,280
Chinook	4,008	13,209	3,867	21,084	1,475
Steelhead	302	688	0	990	--[1]
Total	426,564	1,602,368	11,965	2,040,897	635,490
Statistical Area 13 (Campbell River)					
Sockeye	19,310	531,033	12,449	562,792	11,500
Coho	7,659	62,311	21,726	91,696	32,111
Pink	367	21,009	941	22,317	115,100
Chum	93,352	410,756	3,440	507,548	322,070
Chinook	691	10,446	32,771	43,809	2,151
Steelhead	0	--[1]	--[1]	--[1]	0
Total	121,379	1,035,555	71,327	1,228,162	482,932

[1] None observed.

Commercial Salmon Fishery

The 1982 catch of 3,424,194 salmon was down from the previous year. The landed value would likely exceed that of 1981, as the catch consisted of 90 percent sockeye and chum. The catch of only 109,000 pink salmon was the lowest ever recorded for the District and reflects the problems caused by major flooding in the brood year of 1980.

The 1982 Fraser River sockeye migration returned to normal, with only 28 percent of total stock returning through Johnstone Strait. Although the 1982 sockeye return to the Fraser River was the largest since 1958 (14.3 million), the catch in Johnstone Strait was well below average for an Adams River cycle. The catch of 1,564,459 in 1982 was one million below the 1981 catch.

Restrictions were imposed on the commercial fleet at the peak of the season for the conservation of depleted Gulf pink salmon stocks, which are at a point of extinction.

The 1982 catch of 29,199 chinook salmon by the net fleet is still at an all time low, and improved only slightly from the previous year.

Sport Fishery

Effort in the recreational fishery continues to expand, with more fishermen moving up Island to fish out of Port McNeill and Port Hardy. Due to poor pink returns, fishermen put more effort into fishing for sockeye. Approximately 3,000 were taken, mostly in Alert Bay area. The recreational fishery for shellfish was down because of closures due to shellfish toxicity.

Table 26

CAMPBELL RIVER DISTRICT

1982 Sport Fish Catches*

Species	Tidal[1]
Sockeye	2,350
Coho	24,370
Pink	1,250
Chum	75
Chinook	1,250
Steelhead	0

* Estimates only.
1 These sport fish catches reflect Area 11, 12 and portion of Area 13 north of Seymour Narrows.

Indian Food Fishery

The Indian food fish catch was up slightly from the previous year. This fishery is well organized by subdistrict officers and presents very few problems--for example, in the previous year, the Nimpkish Band agreed not to fish Nimpkish sockeye if DFO continues to restrict commercial fishing on this species.

Table 27

CAMPBELL RIVER DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	25,840
Coho	578
Pink	151
Chum	20,848
Chinook	107
Steelhead	0
Total	47,524

Salmon Escapements

The escapement of sockeye to the Nimpkish was above the previous year--approximately 60,000 escaped to spawning grounds. The other small sockeye-producing streams in the District appear to be about average. Pink salmon returns were low; however, there was an adequate escapement to most streams. Chum escapement was well above average, with more than 50,000 fish returning to Viner Creek. Coho and spring salmon are in serious trouble; strong enhancement measures are needed to sustain a viable commercial fishery on this species in this area.

Herring Fishery

There are not adequate stocks of local herring to sustain a roe fishery in this District. A catch of 613 tonnes was taken for food and bait.

Table 28

CAMPBELL RIVER DISTRICT

1982 Commercial Herring Catch (tonnes)

	Total[1]
Statistical Area 11 (Port Hardy)	
Food & Bait	0
Roe	0
Statistical Area 12 (Alert Bay)	
Food & Bait	89.56
Roe	0
Statistical Area 13 (Campbell River)	
Food & Bait	613
Roe	0

1 All herring fisheries were by seine in this District.

Other Fisheries

The effort by commercial fishermen on crab and prawns was approximately the same as the previous year. The shellfish fishery was closed, due to toxicity, for most of the year.

Table 29

CAMPBELL RIVER DISTRICT

1982 Herring Spawn Deposition*

(standard square metres x 1,000)

Area	1982	1981
11	--	0.82
12	169.83	217.37
13	480.91	272.53

* The 1981 figures in this table are the final data compiled by the Field Services Branch; they do not in all cases correspond with the data published in the 1981 FSB Review.

Enforcement

There were a total of 46 prosecutions in the District; most have been successfully processed to date.

Habitat

In 1982, 436 referrals for input to other government agencies were processed. This was slightly less than the previous year. Logging and other industrial activities, which are the major source of habitat problems, were reduced by the poor economic conditions. However, habitat degradation by industry is still a major problem. Urban and industrial development has slowed down at Campbell River, Port McNeill and Port Hardy.

There are still major problems, such as Quinsam Coal, Westmin, and the Campbell River foreshore development that have not been resolved. The Salmon River dry land sort is still pending.

Construction of B.C. Forest Products' dry land sort in the Campbell River estuary was completed to the satisfaction of everyone.

Table 30

CAMPBELL RIVER DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	29
Forestry	216
Navigable Waters Protection Act	12
Land Use Applications	87
Urban Development	13
Ocean Dumping & Dredging	18
Pollution Control Board:	2
Pesticides	24
Waste Management	16
Highway Development	19
Placer Mining	0
Other	0
Total	436

Salmonid Enhancement

There are a number of small public involvement projects in process. A community advisor is now stationed at Port Hardy, and he will likely get a number of small projects underway on the North Island.

A small coho hatchery has been constructed at Scott Cove. It was funded by a sport fisherman and built by a patrolman.

The hatchery will be in operation in the summer of 1983.

Contact: Norm Lemmen,
District Supervisor,
Campbell River.

Victoria District

The Victoria District includes the southern tip of Vancouver Island from Port Renfrew and Sooke to the west, and Victoria and Saanich Peninsula to the east and north. With offices in Victoria and Sooke, District staff is responsible for the management of the commercial fishery, sport fishery, Indian food fishery, and fish habitat.

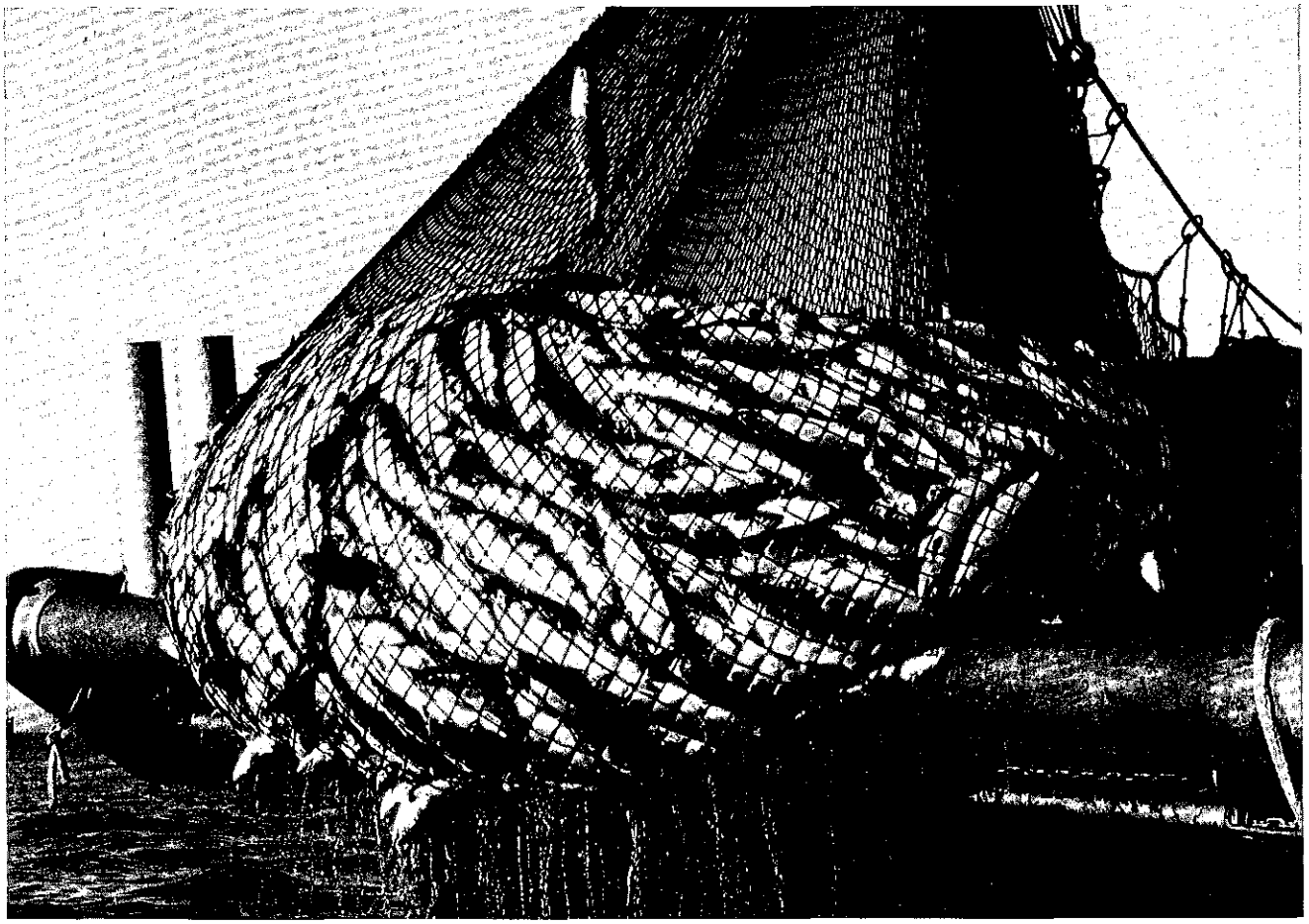
This highly-populated District has a large, year-round sport fishery; a major interception (commercial) fishery controlled by the International Pacific Salmon Fisheries Commission; a growing Indian food fishery; varied and viable fisheries for other species, such as prawn, shrimp, abalone, octopus, and groundfish. Habitat issues such as sewage disposal and contamination, silting, logging activities, and stream rehabilitation are handled by fishery offices and support agencies. Victoria is the birthplace of the Salmonid Enhancement Program and the program is still active.

Commercial Salmon Fishery

The International Pacific Salmon Fisheries Commission opened the 1982 Area 20 interception fishery on Aug. 8 and relinquished control on Sept. 5. Area 20 was fished on eight days. A one-day fishery which took place after the Commission relinquished control saw a large catch of coho. No further fisheries took place in 1982. A greater than normal number of Adams River sockeye passed through Juan de Fuca Strait.

Sport Fishery

There isn't a day that goes by when someone isn't sport fishing in Victoria or Sooke. Whether anglers are targeting on passing summer stocks, winter "feeder" chinook, or jigging for bottom fish, the catch is good. On any given "good weather" day, there are as many as 1,000 boats from Victoria to Otter Point. Obviously, pressure is great,



One good set for this modern drum seiner nets a catch of some 2,000 sockeye salmon.

Table 31

VICTORIA DISTRICT

1982 Commercial Salmon Catch[1]

Species	Gillnet	Seine	Troll	Total
Statistical Area 20 (Blue Line)				
Sockeye	123,276	1,642,200	0	1,765,476
Coho	40,014	66,130	0	106,194
Pink	0	0	0	0
Chum	156	501	0	657
Chinook	1,826	24,979	0	26,805
Steelhead	0	0	0	0
Total	165,272	1,733,810	0	1,899,132

1 Escapement figures are not available for this District.

and in 1982 a substantial number of sockeye were caught during the months of September and October. Large chinook (greater than 14 kg, or 30 pounds) are regularly caught off Becher Bay. Some anglers completed their 30-chinook report and punch card by mid-April.

Nanaimo biological staff conducted a creel census in 1982. Results have not yet been published. The creel census will continue in 1983.

Table 32

VICTORIA DISTRICT

(West of Sheringham Point)

1982 Sport Fish Catches*

Species	Tidal
Sockeye	365
Coho	740
Pink	0
Chum	trace
Chinook	567
Steelhead	NA[1]

* Estimates only;
[1] Not available.

Indian Food Fishery

The food fish catch increased in District 6 in general; but specifically, some 5,000-6,000 chum were gaffed in the Goldstream River. A further 1,000 Goldstream River chum were taken by seine in Saanich Inlet. The resurgence of Indian rights played a large part in the increased activity in the Goldstream and San Juan River systems.

Table 33

VICTORIA DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	0
Coho	800
Pink	0
Chum	6,200
Chinook	200
Steelhead	0
Total	7,200

Herring Fishery

Table 34

VICTORIA DISTRICT

1982 Commercial Herring Catch (tonnes)

	Total[1]
Statistical Area 19 (Victoria/Saanich)	
Food & Bait	514
Roe	0

[1] All herring fisheries were by trawl in this District.

Other Fisheries

The District supported a varied fishery for species other than salmon in 1982. Saanich Inlet produced 3,600 kg of prawns, while Sooke Basin and Harbor provided a total catch of 34,000 kg of shrimp. The sea urchin fishery reached its quota of 68,000 kg by mid-December. Crab fishermen enjoyed consistently good catches and reported good recruitment of juveniles in some heavily-harvested areas. Only one boat harvested geoducks, as much of the area is depleted. Juan de Fuca Strait supports a small mid-water trawl fishery, although stocks of Pacific cod are low. In addition, 1982 was a good year for octopus fishing. The octopus fishery spawned a new fishery; scallops.

The scallops are consumed by local restaurant patrons, but are highly susceptible to contamination, resulting in a closure of Area 19 for most of the latter half of 1982.

Salmon Escapements

Chum salmon continue to return in record numbers. Goldstream River saw a return of 30,000 fish from a brood year of 28,500. To minimize the effects of overspawn, approximately 10,000 chum salmon were taken at the mouth of Goldstream. Total escapement, taking into account the Indian food fishery, was 14,000 fish. The San Juan system had a ten-fold increase of chinook from a brood year of 1,000. This is mainly due to enhancement activities--both incubation and stream rehabilitation.

Unfortunately, brood-year flooding decimated the coho returns to the Sooke River system. This would account for the again-dismal coho return to Colquitz River.

Habitat

As in 1981, habitat issues centered around the problem of the highly-urbanized environment. The salmon-producing streams in the Victoria area are subject to heavy silting, and encroachment by landowners on the stream banks. Vertebrate and invertebrate species in the Colquitz River were killed when 13.6 million litres of raw sewage were discharged inadvertently into the river. Coho fry were spared, as their rearing areas are upstream from the sewage pumping station. Charges were laid against the Regional District, resulting in a $2,000 fine. Fortunately, almost all communities bordering salmonid habitat are now on sewage systems. It is hoped that increased monitoring by government agencies will ensure that similar accidents are few and far between.

Stream rehabilitation continues; most producing streams are now free of logjams and large barriers. In 1982, an unidentified freighter discharged a large amount of bunker "C" into Juan de Fuca Strait. Patrol vessels monitored the movement of this substance; the Canadian shoreline was not polluted.

In addition, marine development continues, in order to accommodate the burgeoning small vessel fleet.

Table 35

VICTORIA DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	26
Forestry	27
Navigable Waters Protection Act	20
Land Use Applications	40
Urban Development	2
Ocean Dumping & Dredging	28
Pollution Control Board:	-
Pesticides	42
Waste Management	15
Highway Development	10
Placer Mining	1
Other	16
Total	227

Enforcement

Heavy pressure on the fish resource, a highly-urbanized and densely-populated environment, and poor economic conditions were all factors resulting in enforcement activities in the District in 1982.

Sport fishing occurs all year and occupies the lion's share of fishery officers' time. A total of 62 charges were laid; 47 cases were convictions, two were dimissed, two were stayed, four were withdrawn, and seven are pending.

Officers monitor the commercial salmon fishery in Area 20. Several charges were laid for illegal gear. As the State of Washington conducts a gillnet fishery in Juan de Fuca Strait at the same time as the Canadian fish-

ery, much time is spent patrolling the international boundary. Consequently, ten American gillnetters were convicted in Victoria courts for offences under the Coastal Fish Protection Act.

The illegal sale of sport-caught salmon continues, with fishery officers hard pressed to apprehend the violators.

Local officers had some success in curbing the lucrative abalone-poaching activities. Nine individuals were charged with 19 counts under the Shellfish Regulations, fines up to $3,000 were levied and gear was forfeited.

Salmonid Enhancement Program

The community development project (CDP) at Port Renfrew, as well as many of the public involvement groups, increased the number of salmonid fry released in 1982 over the previous year. Port Renfrew CDP propagated all species of salmon except pink. The chinook egg-take was increased by almost 40 percent, and the chum egg-take was increased by more than 600 percent. However, egg collection for coho declined by 20 percent and sockeye declined by 106 percent.

During 1982, the number of public involvement projects increased from six to ten. They ranged from a few thousand chum eggs in a classroom incubator at Shawnigan Lake to more than 500,000 eggs in a volunteer hatchery at Sooke. For example, a satellite hatchery was built on the Goldstream River under the auspices of the federal Bridging Assistance Program; it will be used for educational purposes as well as to supply coho fry to barren or depleted streams in the Victoria area. School students worked on Tod, Reay, and Sandhill Creeks in the Sidney area. Meanwhile, senior citizens assisted the provincial Fish and Wildlife Branch with cutthroat trout enumeration on Colquitz Creek, helped Sidney anglers with the transplant of coho fry to Reay Creek and with instream fry-feeding programs at Goldstream and Sooke.

Contact: Larry Duke,
District Supervisor,
Victoria.

Management Biology

Under the direction of the senior biologist, the Management Biology Unit undertakes investigative programs and various other activities to provide the biological basis for, and to assist in, the management of fisheries. The Unit includes three management support biologists (one assigned to salmon fisheries, one to the herring fisheries, and one to the shellfish, crustacean and miscellaneous fisheries) and five technicians.

Contact: Don Anderson,
Senior Management Biologist,
Nanaimo.

Georgia Strait Creel Survey

The creel survey was conducted in 1982 with the aid of subsidies from various job creation programs. Job Creation staff interviewed anglers at boat ramps, marinas, and public docks. Data from these interviews were analysed to determine sport catch per unit of effort. Estimates of sport effort were gained from aerial counts of sport boats actively fishing. Aerial counts, coupled with angler interviews at landing sites, provided estimates of sport catch by month and statistical area.

In 1982, modifications made to sampling procedures improved the efficiency of the program. The results of each interview with anglers were subjected to at least three editing checks to assure accuracy; also, the timing of the overflights was designed to correspond to daily peaks in sport fishing activity. In 1982, 20,499 interviews and 42 overflights were conducted. From this, the estimated sport fishing effort was 669,000 boat trips and the total salmon catch was 658,000. Of the

658,000 salmon caught by Georgia Strait anglers in 1982, 173,000 were chinook and 470,000 were coho. A breakdown by month and statistical area is included in the following tables. For some months (due to budgetary problems), only indirect estimates were available. Indirect estimates were based on average catches from other years, coupled with some in-season data, and are shown as monthly totals only.

The causes of the much reduced chinook sport catch are uncertain. However, it is expected that a combination of declining chinook stock strength and the 18-inch chinook sport size limit implemented in 1981 have influenced catches.

Table 36

Estimated Chinook Catch* by Sportfishermen in Georgia Strait by Month and Statistical Area, Jan 1982 to Dec 1982

Statistical Area**

(Catches in thousands of pieces)

Month	13	14	15	16	17	18	19A	19B+	28	29	Total
Jan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14.0***
Feb	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.6***
Mar	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.5***
Apr	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.3***
May	2.3	4.6	.5	2.2	3.5	1.0	.5	2.7	1.5	1.0	19.8
	(.3)	(2.4)	(.3)	(.4)	(.7)	(.4)	(.2)	(.5)	(.2)	(.2)	(2.7)
Jun	3.1	3.3	.2	.9	1.5	2.2	1.3	3.7	.7	.3	17.2
	(.5)	(.7)	(.1)	(.2)	(.3)	(.7)	(.3)	(.3)	(.3)	(.2)	(1.5)
Jul	3.7	3.6	.1	2.2	5.8	5.4	2.1	3.6	1.9	1.4	29.8
	(.5)	(.8)	(0.0)	(.7)	(1.1)	(1.4)	(.6)	(.2)	(.9)	(.5)	(2.7)
Aug	5.0	3.0	.6	1.5	4.5	3.5	3.0	4.3	1.0	.4	26.8
	(.8)	(.5)	(.2)	(.5)	(1.2)	(1.5)	(.3)	(.4)	(.4)	(.2)	(2.5)
Sep	5.4	.6	.2	.3	1.7	1.0	4.8	8.2	.2	.5	22.9
	(3.3)	(.3)	(.1)	(.1)	(.5)	(.3)	(.8)	(1.3)	(.2)	(.3)	(4.4)
Oct	0.0	0.0	0.0	.4	.5	0.0	.3	3.4	.1	.1	4.8
	(0.0)	(0.0)	(0.0)	(.3)	(.2)	(0.0)	(.1)	(.7)	(.1)	(0.0)	(1.4)
Nov	.08	0.0	.1	.9	.3	0.0	0.0	2.2	.4	.2	4.2
	(.1)	(0.0)	(.2)	(.6)	(.1)	(0.0)	(0.0)	(.7)	(.2)	(.2)	(1.1)
Dec	.2	.1	.3	.4	.7	.1	.1	3.2	1.8	.5	7.4
	(.2)	(.2)	(.5)	(.2)	(.3)	(0.0)	(.1)	(.1)	(.8)	(.5)	(1.6)

* Kept fish only.
** Confidence interval of estimate in brackets.
*** Indirect estimate.
NA Not available.

Salmon Programs

a) Nimpkish Test Fishing Program--Area 12

For the second consecutive year, a gillnet test fishing program was carried out from early June to mid-August. Conducted in areas used by both Nimpkish and Fraser River returning sockeye stocks, the program is designed to assess the exploitation rates, age, timing, abundance and migration patterns of Nimpkish sockeye.

b) Johnstone Strait Test Fishing Program--Areas 12 and 13

The upper Johnstone Strait chum seine test fishery is operated annually from September through October. Since 1965, this program has aided managers in the assessment of in-season chum stock strength, timing and composition. Similar information was collected in 1982 by a seine vessel working in the lower portion of Johnstone Strait.

Table 36 Contd

Estimated Coho Catch* by Sportfishermen in Georgia Strait by Month and Statistical Area, Jan 1982 to Dec 1982

Statistical Area**
(Catches in thousands of pieces)

Month	13	14	15	16	17	18	19A	19B+	28	29	Total
Jan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.0***
Feb	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3***
Mar	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.9***
Apr	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14.2***
May	9.7	54.2	.7	11.4	1.5	.5	.2	.4	0.0	.3	78.9
	(3.8)	(31.7)	(.3)	(1.9)	(.3)	(.2)	(.1)	(.1)	(0.0)	(.6)	(32.0)
Jun	22.8	33.4	1.6	5.6	6.6	.6	.3	.1	.4	.4	71.8
	(3.4)	(8.4)	(.7)	(1.9)	(1.8)	(.2)	(.1)	(0.0)	(.2)	(.2)	(9.5)
Jul	60.9	41.7	4.7	12.0	6.7	.2	.7	2.8	3.5	3.1	136.3
	(7.1)	(8.5)	(1.4)	(3.0)	(1.3)	(.1)	(.4)	(.5)	(1.5)	(1.2)	(11.8)
Aug	20.8	20.0	4.8	16.8	9.1	2.2	.5	4.5	3.9	2.7	85.3
	(2.7)	(3.0)	(1.9)	(4.8)	(2.5)	(.9)	(.1)	(.8)	(1.3)	(1.1)	(7.3)
Sep	33.3	10.8	.6	.9	3.8	.4	2.8	6.5	1.0	.7	60.8
	(17.2)	(3.6)	(.4)	(.42)	(1.1)	(.1)	(.9)	(1.1)	(.5)	(.4)	(17.7)
Oct	.4	.6	0.0	.1	2.8	1.1	.8	2.3	.2	.1	8.4
	(.4)	(.4)	(0.0)	(.1)	(.9)	(.9)	(.6)	(.5)	(.1)	(0.0)	(1.8)
Nov	0.0	.1	0.0	0.0	.2	.2	.2	1.9	0.0	0.0	2.6
	(0.0)	(.1)	(0.0)	(0.0)	(.1)	(.1)	(.1)	(.7)	(0.0)	(0.0)	(.9)
Dec	0.0	0.0	0.0	0.0	.1	.2	.3	.9	0.0	0.0	1.5
	(0.0)	(0.0)	(0.0)	(0.0)	(.1)	(.1)	(.2)	(.3)	(0.0)	(0.0)	(.6)

* Kept fish only.
** Confidence interval of estimate in brackets.
*** Indirect estimate.
NA Not available.

c) Strait of Georgia Test Fishing Program --Areas 14 and 18

Gillnet test fisheries were conducted during October and November off Puntledge, Qualicum and Cowichan Rivers. Testing attempted to indicate chum stock strength, timing and quality for the purpose of commercially cropping for maximum yield and escapement. As a result, successful commercial gillnet fisheries took place at each of the three terminal areas.

d) Swiftsure Shaker Monitoring Program

This program, initiated in 1981, was conducted again in 1982. Two vessels were chartered to fish on Swiftsure Bank to monitor the incidence of chinook shakers (below the legal size limit) during the early season troll fishery. The 1982 program started on April 22 and ran until June 23.

The two vessels, the Cowichan and the Green Sea, fished patterns on Swiftsure Bank, keeping records of shaker and keeper chinook. These data

Table 36 Contd

Estimated Total Salmon Catch* by Sportfishermen in Georgia Strait by Month and Statistical Area, Jan 1982 to Dec 1982

Month	Statistical Area** (Catches in thousands of pieces)										
	13	14	15	16	17	18	19A	19B+	28	29	Total
Jan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.0***
Feb	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.9***
Mar	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.6***
Apr	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	21.9***
May	16.1	59.4	1.2	13.6	4.9	1.5	.7	3.2	1.5	1.3	103.4
	(4.1)	(31.8)	(.4)	(1.9)	(.8)	(.4)	(.2)	(.7)	(.2)	(.2)	(32.1)
Jun	26.4	36.9	1.7	6.5	8.1	2.8	1.6	3.8	1.2	.7	89.8
	(3.4)	(8.5)	(.7)	(1.9)	(1.8)	(.7)	(.6)	(.5)	(.3)	(.3)	(9.6)
Jul	65.0	45.4	4.8	14.7	12.5	5.6	2.8	6.5	5.5	4.7	167.5
	(7.2)	(8.5)	(1.4)	(3.1)	(1.7)	(1.4)	(1.2)	(1.1)	(1.7)	(1.3)	(12.1)
Aug	26.3	23.0	5.4	18.6	13.8	5.8	3.5	8.9	5.1	3.2	113.6
	(2.9)	(3.1)	(1.9)	(4.8)	(2.7)	(1.7)	(.6)	(1.3)	(1.3)	(1.1)	(7.7)
Sep	39.1	11.5	.8	1.2	5.7	1.4	8.5	14.8	1.3	1.6	85.8
	(17.5)	(3.6)	(.4)	(.4)	(1.2)	(.3)	(1.9)	(2.9)	(.6)	(.6)	(18.3)
Oct	1.6	.8	0.0	.5	3.4	1.6	1.1	5.9	.3	.1	15.3
	(1.0)	(.5)	(0.0)	(.3)	(.9)	(.9)	(.7)	(1.8)	(.1)	(0.0)	(2.5)
Nov	.1	.3	.1	.9	.5	1.9	.2	4.1	.5	.2	8.8
	(0.0)	(.2)	(.3)	(.6)	(.2)	(1.1)	(.2)	(1.1)	(.3)	(.2)	(1.8)
Dec	.3	.2	.3	.4	.8	.9	.4	4.2	1.8	.5	9.7
	(.2)	(.2)	(.5)	(.2)	(.3)	(.4)	(.3)	(1.2)	(.8)	(.5)	(1.7)

* Kept fish only.
** Confidence interval of estimate in brackets.
*** Indirect estimate.
NA Not available.

were telephoned in daily to the Nanaimo office, where they were analyzed, to assess the scope of the problem. For example, if the shaker:keeper ratio was high and a large fleet was present, DFO would close the area and monitor with the charter vessels until the problem abated.

However, shakers did not present problems in 1982, and Swiftsure Bank was not closed during this early fishery. This was a contrast to 1981, when the bank was closed for most of the season. It is now apparent that it is not possible to anticipate the severity of the shaker problem on the west coast of Vancouver Island before the season begins.

e) Barkley Sound Chinook Test Fishery

In 1982, this test fishery was in its fifth year of operation. A gillnet vessel (the Shane-E) was chartered to fish before the commercial fishery to assess the strength of chinook stocks. This vessel fished for three weeks and took scale samples and relative abundance estimates, as in previous years. The test fishery indicated no significantly greater (or lesser) abundance than had been anticipated in the preseason fishing pattern.

The catch from this fishery was 42,000 chinook; 47 percent were three-year-olds, 49 percent were four-year-olds, and four percent were five-year-olds. Adequate escapements to the Somass system (including Robertson Creek hatchery) were achieved.

f) Barkley Sound Sockeye Test Fishery

Early returns to the Stamp River in 1982 raised concerns about the strength of the Great Central Lake sockeye run. It was feared the escapement goal of 200,000 sockeye would not be reached. This concern led to the institution of this test fishery to assess the relative strengths of Great Central and Sproat Lake stocks.

The test fishery, undertaken jointly by the Unit and the Parasitology and Fish Health Section at the Pacific Biological Station in Nanaimo, examined samples for stock-specific parasites. On the basis of information on relative stock strengths, the fishery was closed on July 8, 1982--earlier than in previous years.

This closure ultimately provided an escapement of 166,000 sockeye to Great Central Lake, and exceeded the goal of 100,000 sockeye escaping to Sproat Lake. Had the fishery not been closed, a severe underescapement to Great Central Lake would have occurred.

Even with this closure, 410,000 sockeye were caught, with a landed value of $2.2 million.

Herring Programs

a) Resident Herring Survey

Due to increased fishing pressure from local bait operators and little documentation on resident herring stocks, a survey was conducted to assess the distribution, abundance and age composition of resident (homestead) herring stocks and juvenile rearing areas. The survey focussed on the traditional bait fishing locations such as Stuart Channel, Porlier Pass, Jervis Inlet, Sechelt Inlet, Stuart Island and Discovery Passage. The 1982 survey was the second of an ongoing survey to be conducted over several years in order to determine trends. A preliminary report is written each year for in-house management use.

The MV Walker Rock was used to assess the distribution and abundance by plotting herring schools on marine charts. Age compositions were obtained from biological samples. In addition, both adult and juvenile herring were tagged, using Floy anchor tags. Tagging was carried out in Pender Harbor, Bargain Harbor and Discovery Pass.

For background data, local bait fishermen were interviewed to ascertain locations and fishing techniques, as well as to gather opinions on historic

abundance and distribution of local herring stocks.

b) 1982 Food and Bait Fishery

This project provides the food and bait herring manager with data on abundance, age and size prior to and during the 1982 food and bait fishery.

Traditional echosounding and seining techniques were used to provide data on distribution, abundance, and biological samples for age and size. Tagging was also carried out in Stuart Channel, Porlier Pass and Trincomali Channel in an attempt to determine migration patterns and the contribution of these stocks to the Georgia Strait roe fishery.

The MV Walker Rock was used as the working platform for this project in conjunction with the patrol vessels involved in the fishery and research vessels from the Pacific Biological Station.

c) Pre-Roe Herring Fishery Seine Charters

This Regional program provided fishery managers with estimates of stock tonnages and biological data required to manage the roe fishery. In 1982, twelve commercial seine boats were chartered to carry out test seine sets and provide samples in potential commercial fishing areas. Samples were also obtained from areas where no commercial fisheries are permitted.

The biological data are passed to fishery managers for in-season use and changes to fishery strategies are made accordingly.

A herring pump and dewatering device are used to transfer roe herring from the net to the hold of a seine boat.

Samples taken from each test are sent to Vancouver for further analysis. The data are then sent to the Pacific Biological Station, Nanaimo, for use in the herring population stock assessment, which is vital in herring management predictions.

d) Annual Herring Fishery and Spawn Report

This report provides information on all B.C. herring fisheries as well as data on the size and timing of the spawn depositions throughout the coast. The highlights of the current year's fishery and spawnings are documented for use by District fishery officers, fishermen, processors and the public.

Spawn maps and spawn summary tables are collected from District offices and sent to the Pacific Biological Station in Nanaimo. Analysis of the spawn data converts the length, width and density of spawn deposition to standard square metres. These figures, compared with depositions of previous years, give an indication of escapement to the spawning areas. The report also shows any shift in herring spawning habits, which can be crucial in the management of subsequent fisheries.

e) Echosounder Evaluation

Field tests of various echosounders were conducted for the Technical Services Branch. One of the echosounders was to be purchased by the Department to replace outdated equipment currently on board Ship Division vessels.

The M/V Walker Rock was used to carry out field tests on the practical aspects of various echosounders. From the results of these tests, in conjunction with lab tests carried out by the Technical Services Branch, twelve Rayethon J.F.F. 101 echosounders were purchased for use during the 1982 roe herring fishery; another twelve echosounders are expected to be purchased during the next fiscal year.

f) Herring Management Course

At the request of FSB's training and career development officer, the Unit developed a basic course in herring biology, current management practices, and the technical and practical aspects of using sonar and echosounders to locate and estimate the biomass of herring stocks. Fishery officers and Ship Division staff attended the course, which was held over a two-week period in Prince Rupert for North Coast staff and in Fulford Harbor for South Coast staff. The M/V Walker Rock and Ship Division's vessels were utilized to provide actual field experience in locating and estimating herring stocks.

Shellfish, Crustaceans, and Other Marine Species Programs

This Section is involved in the invertebrate fisheries: abalone, geoduck clams, horse clams, intertidal clam species, mussels, scallops, octopus, squid, sea urchin, sea cucumbers, crab, shrimp, prawns, and euphausiids.

Landings in the abalone fishery increased in 1982 in the South Coast in the Port Hardy and Victoria areas. Landings of geoducks for 1982, 2.9 million kilograms, were primarily from the west coast of Vancouver Island. A minor diving fishery for horse clams took place in 1982. In cooperation with Pacific Biological Station, the Section monitored commercial prawn catches. Catch rates, sex, and size composition and fishing effort in various management areas were examined to allow for escapement of an adequate spawning stock. Recommendations were made to close an area if the index of female spawners fell below a monthly minimum acceptable level.

Several resource surveys were carried out in 1982--geoduck grounds were surveyed in Tofino and Kyuquot, an examination of hydraulic clam harvesting was conducted in Mary Basin, and abalone were surveyed in Victoria district.

Several proposals for mariculture

were reviewed. A fisheries mariculture policy is being developed.

This Section was also involved in consultations with the interdepartmental Marine Plant Working Group, the Pacific Shellfish Standing Committee, the Shellfish Resource Board, and industry fishing groups such as the Abalone Harvesters Association and the Underwater Harvesters Association (geoduck and horseclam licence holders).

Contact: Don Anderson,
Senior Management Biologist,
Nanaimo.

Habitat Management

Decentralization of Habitat Management staff got underway in August 1982, with the appointment of an acting senior habitat management biologist for the South Coast Division. The other two Habitat positions originally assigned to the Division--habitat management biologist and technician--were subsequently staffed.

In December, the FSB director announced the decentralization of additional Habitat Management staff to the areas; the South Coast Division was allocated an additional five positions. All assigned Habitat staff should be in place in Nanaimo by June 1983.

Discussions have been initiated with District staff and the Habitat core group with respect to the roles of decentralized Habitat staff and allocation of resources to ensure that Habitat Management activities within the Division are carried out as effectively and efficiently as possible.

Contact: Bruce Hillaby,
A/Senior Habitat Management Biologist,
Nanaimo.

Vancouver Island Inspection District

The Vancouver Island Inspection District covers fish processing plants on Vancouver Island, the Gulf Islands, Quadra and Cortes Islands. There were 42 processing plants and/or cold storage plants and 30 fish camps in operation in the District in 1982.

Sewage contamination problems in the Gulf of Georgia continued to be a major problem in the shellfish industry. Although these contamination problems resulted in seasonal spot closures on Gabriola and Saltspring Islands and on the east coast of Vancouver Island, it was not serious enough to warrant the closure of entire statistical areas (as was the case in 1981). However, all commercial shellstock lots from Area 17 were held pending satisfactory bacteriological analyses. PSP blooms in the upper Gulf, and an unusually late September bloom in the lower Gulf, also caused the closure of some areas. These sewage contamination and PSP problems resulted in a 70-percent increase in bacteriological and chemical analyses of molluscs to ensure that all products entering the market were safe for human consumption. As of the end of 1982, only two statistical areas of Vancouver Island remained completely open for the harvesting of all bivalve molluscs.

In 1982, the first commercial-scale depuration plant for clam shellstock on Vancouver Island commenced operations in Sooke. This resulted, for the first time, in harvesting under permit of previously-unutilized stocks of manila and littleneck clams in polluted areas closed under Schedule I of the Pacific Shellfish Regulations.

Food herring landings in 1982 were down drastically over the 1981 landings. Only two small processors par-

ticipated, with their total production being less than 45.3 tonnes.

As part of the Quality Improvement Program, quality grade standards for oysters and geoducks were drafted. In addition, considerable time was spent compiling data bases for previously-drafted quality grade standards for salmon, herring and groundfish. Some preliminary work was also started on standards for vessel operation, standards for handling, unloading and transportation, and standards for in-plant quality control.

In the laboratory, developmental work was done to assess the rapid identification of faecal coliforms, specifically the use of A-1 modified media in the assessment of the bacteriological quality of shellfish.

The problems associated with Canadian canned salmon were a major highlight of 1982. Approximately five months of full-time work by one officer were required to supervise the culling of just one company's pack. In addition, the three-month secondment of the district supervisor, as part of an Inspection team, was required to recertify Canadian canned salmon in Australia and New Zealand.

In 1982, there was a significant increase in the direct export of round Pacific dogfish by fishermen. The dogfish, incidental catches in groundfish trawls, are exported to American processors, primarily in Bellingham, WA. In addition a considerable amount of round chum salmon were exported directly, in the same manner, when fishermen encountered resistance on the part of Canadian processors to buy their catch.

Contact: Wayne Holmes,
Inspection Supervisor,
South Coast Division.

Northern Operations

The Northern Operations Branch is responsible for an area encompassing 153,000 sq km and includes Areas 1 through 10 (from Cape Caution north to the Alaska border), including the Queen Charlotte Islands, and extends inland to cover the entire Skeena and Nass River watersheds. Twenty percent of the total B.C. catch in 1981 was processed in the north.

Commercial Fishing

The herring spawn-on-kelp harvest was a 1982 success story. Twenty-three licence holders harvested a total of 132.6 tonnes of product. In 1982, the individual quota (6.58 t per licence holder) was determined by the net weight of product weighed at the processing plant after a minimum draining period. Herring mortality in enclosures continues to be a concern. Open-type ponding, which was allowed this year on an experimental, voluntary basis, appeared to alleviate this concern, at least in specific locations.

The abalone fishery continued with the same individual quotas as last year (3,629 kg/licence), but the 1982 season was extended by two months--it opened on February 15 rather than on April 15. Area 6 produced 31 percent of the northern catch, although the total quota was not taken.

Strong returns of sockeye resulted in a good salmon season for net fishermen. An unexpected poor return of Alaskan pink salmon resulted in only 33 delieveries to local processors by American vessels. This showed a 70 percent reduction in poundage--down to 1.45 million kilograms--when compared with the quantity of Alaskan salmon processed in the north in 1981.

Groundfish landings were only about one half of what they were a year ago --7,428 tonnes were landed.

The fishing season came to a close with a very modest food and bait herring fishery. In 1982, the northern quota was reduced to 2,268 tonnes from 272 tonnes. The resulting catch of only 136 t suggests continuing soft markets and poor economic climate in the industry.

Indian Food Fishery

The Nass and Skeena River systems continue to account for almost 30 percent of all Indian subsistence food fish taken in B.C. With the exceptional sockeye returns to these two rivers, there were very good catches in 1982. Negotiations continue with the native Indian community to establish a cooperative management program in which they will participate in the management of the food fishery.

Habitat

The poor economic climate resulted in many of the activities of the mining and forest industry coming almost to a standstill. On the other hand, port and industrial development at Prince Rupert (Ridley Island) and at Kitimat expanded. In addition, there is a proposal for a major LNG (liquefied natural gas) plant to be constructed at Port Simpson.

There is also growing concern in the north about the prospects of major offshore oil explorations in the vicinity of the Queen Charlotte Islands.

Contact: Eric Kremer,
Director, Northern Opertions;
Tom Perry,
Operations Manager,
Prince Rupert.

Kitimat District

This District extends from Kitimat south to Cape Caution, an area of some 77,000 km of coastline, containing 240 salmon-producing systems. The major population centers are Kitimat, Bella Coola and Bella Bella, as well as numerous smaller centers and native Indian communities throughout the District.

Management of the various fisheries and protection of fish habitat in the District are complicated and consequently more costly because of the vast distance and remoteness of the areas involved.

Commercial Salmon Fishery

Trolling opened in the outside waters of the District in mid-April. A two-week troll closure was implemented in northern waters in June for conservation of chinook. Trolling in inside waters was generally restricted to net fishing times and places throughout the season.

Net fishing in the District commenced in mid-May with the opening of the chinook fishery in the Bella Coola gillnet area. This fishery was restricted to one day per week until early August for conservation of chinook. A total of 6,000 chinook were taken this season. As expected, the pink returns to Area 8 streams (and in particular the Bella Coola/Atnarko system) were dismal--a result of the 1980 floods. Only 36,000 pink salmon were taken in the net fishery. Although chum are usually taken incidentally in the pink fishery, this season's chum catch comprised the bulk (165,000 pieces) of the Area 8 net catch.

The net fishery commenced in Area 6 and 7 in mid-July. Again the big disappointment was pink production--less than 30 percent of pre-season forecasts. The chum catch in Area 6 was

somewhat better than expected. In an effort to reduce the interception of chum and pink passing through Area 7, the outside portion of Milbanke Sound (along with Laredo Sound) remained closed to net fishing until early August; it appears that this management strategy was effective. Chinook were exploited rather heavily by seines along the St. Johns Harbor shore (Milbanke Sound) during the first two weeks of August. This exploitation may be reduced in 1983.

As expected, only a limited sockeye fishery (42,000 pieces) materialized in Rivers Inlet.

A "test" gillnet fishery commenced in Smith Inlet during the first week of July. Although the pre-season forecast was for only a limited fishery, sockeye returned much better than expected to Long Lake; 286,000 sockeye were taken in a gillnet fishery that continued until mid-August.

Almost 2 million salmon (1,975,000) were taken by net fishermen in the Central Coast this season; 60 percent by seine and 40 percent by gillnet. This represents a relatively poor even-year catch, particularly when compared with pre-season expectations.

Table 37

KITIMAT DISTRICT
1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 6 (Butedale)					
Sockeye	4,246	44,560	934	49,740	30,200
Coho	10,153	40,405	17,694	68,252	48,260
Pink	11,938	545,364	5,084	562,386	310,160
Chum	27,236	88,556	484	116,276	134,185
Chinook	507	6,945	13,494	20,946	11,475
Steelhead	28	2	NA*	30	0
Total	54,108	725,832	37,690+	817,630	534,280
Statistical Area 7 (Bella Bella)					
Sockeye	10,067	121,200	2,159	113,426	4,607
Coho	11,312	27,163	23,486	61,961	2,730
Pink	7,326	139,585	4,156	151,067	172,655
Chum	133,327	103,306	694	237,327	201,872
Chinook	1,244	18,608	24,329	44,181	0
Steelhead	0	0	24	24	0
Total	163,276	409,862	54,848	627,986	381,864
Statistical Area 8 (Bella Coola)					
Sockeye	17,029	11,604	1,559	30,192	25,555
Coho	6,563	2,213	10,696	19,472	8,750
Pink	14,302	21,895	1,539	37,736	195,320
Chum	155,628	9,718	1,186	166,532	127,110
Chinook	6,277	3,257	2,978	12,512	10,000
Steelhead	851	2	7	860	0
Total	200,650	48,689	17,965	267,304	366,735

Sport Fishery

The majority of the non-tidal sport fishing effort in this District takes place in rivers near Kitimat and Bella Coola (Kitimat, Dala, Kildala, Kemano, Bella Coola, Atnarko and Dean Rivers). An estimated 2,000 coho, 1,200 chinook and 400 steelhead were taken this season.

The tidal sport fishery in the Central Coast is concentrated in Douglas Channel (Kitimat), Rivers Inlet, Hakai Pass and North Bentinck Arm (Bella Coola). The estimated salmon sport catch this season was 21,550 pieces--approximately 50 percent chinook, 40 percent coho and 10 percent pink.

Sport fishermen were very successful this year in Douglas Channel, with a mean catch per unit effort of 0.21. The Kitimat sport fishery warden reports that the largest chinook taken from Douglas Channel weighed in at 24.3 kg (54 lbs), and a halibut of approximately 90 kg (200 lbs) was also reported to Kitimat staff.

Rivers Inlet continues to support a healthy sport fishing charter business and attracts a number of private boats to its waters each summer. Two distinct runs of big chinook occur each year, one peaking near the end of June and the second in the first two weeks of August. The largest chinook taken in the permit area of Rivers Inlet this season weighted 31.5 kg (70 lbs).

In addition to salmon, an estimated 2,500 lingcod, 3,500 rockfish, 1,450 halibut, 15,000 crabs, 1,200 kg of shrimp and prawns, 1,200 kg of abalone and 100 kg of herring were taken by sport fishermen in District 7.

In 1982, a sport fish warden was hired for the purpose of gaining

Table 37, Contd

KITIMAT DISTRICT
1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 9 (Rivers Inlet)					
Sockeye	42,260	0	NA*	42,260	823,000
Coho	1,275	0	NA	1,275	6,375
Pink	2,185	0	NA	2,185	100,000
Chum	11,300	0	NA	11,300	102,180
Chinook	405	0	NA	405	2,250
Steelhead	0	0	NA	0	0
Total	57,425	0	NA	57,425	1,033,805
Statistical Area 10 (Smith Inlet)					
Sockeye	285,950	0	NA	285,950	214,000
Coho	4,670	0	NA	4,670	2,200
Pink	2,470	0	NA	2,470	9,031
Chum	20,615	0	NA	20,615	70,000
Chinook	3,680	0	NA	3,680	1,500
Steelhead	0	0	NA	0	0
Total	317,655	0	NA	317,655	296,731

* Not available.

statistics and more control over the large sport fishery in Douglas Channel and the Kitimat River system. As a result, a good understanding of the sport fishery in this area has been gained. In addition, there was an increase in sport fishing violation prosecutions, from six counts in 1981 to 83 counts in 1982. The sport fish warden accounted for 46 counts.

The warden gathered all statistics on the sport fishery, acted as spokesperson, as required, to interested sport fishing groups, and posted closed areas, closed times, and public notices for the sport fishery.

Table 38

KITIMAT DISTRICT

1982 Sport Fish Catches*

Species	Tidal	Nontidal
Sockeye	400	0
Coho	8,500	2,000
Pink	2,300	0
Chum	350	0
Chinook	10,000	1,200
Steelhead	0	600
Total	21,550	3,800

* Estimates only.

Indian Food Fishery

In 1982, a total of 524 food fishing licences were issued to the natives of the Kitamaat, Hartley Bay, Kitasoo, Bella Bella, Bella Coola and Owikeno Bands. Band licences were issued to the Kitamaat, Hartley Bay, and Kitasoo Bands, which in turn issued individual licences to band members upon request.

Catch statistics for this food fishery are compiled by observing fishing operations, interviewing fishermen and from band-supplied numbers (approximately 40 percent, 40 percent and 20 percent respectively).

There were no native food fishery prosecutions in 1982; illegal food fishing activities seem minimal in the Central Coast.

Table 39

KITIMAT DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	17,789
Coho	3,405
Pink	2,093
Chum	7,755
Chinook	3,758
Steelhead	1,069
Total	35,869

Salmon Escapements

Area 6 received average sockeye and coho escapements. Pink returns were very poor, only one-third of the expected stock materialized. The chinook return was above average, but desired escapement is still low; chum are just below average.

Area 7 experienced poor escapement this year, considering the restricted fishing times which were put into effect. Escapement totalled 151,000 pink (10-year average of 276,000) along with 170,000 chum (10-year average of 200,000).

Area 8 had poor escapements for both sockeye and coho, with a very poor pink return--200,000 returned from a brood year of 900,000. Chum returns were average, and the chinook escapement to the Atnarko system was improved, due to commercial/sports fishery conservation measures. (Sockeye and chinook escapement estimates could be low, as some major streams were not inspected due to budget restraints.)

Area 9 received good escapements for sockeye (800,000) and chum, with pink

and coho showing average returns. The chinook escapement overall was low and was most apparent in the Wannock system. Area 10 sockeye and chum both had good returns; chinook and coho escapements were average, and pink returns were poor.

Herring Fishery

The roe herring fishery in the Central Coast consisted of four openings in Areas 6 and 7.

There was a 24-hour gillnet fishery in subareas 6-16, 6-17 and 6-18 (Kitasu Bay-Higgins Pass). One hundred and five gillnets caught an estimated 369 tonnes.

In Stryker Bay (subarea 7-18), thirty seines took an estimated 2,381 tonnes of herring. Roe recovery was over 10 percent.

Three hundred gillnets caught an estimated 3,061 tonnes of herring in an 18-hour fishery in the Cape Mark-Thompson Bay area (subareas 7-1, 7-2 and 7-19). Following the fishery, stock remaining in the area was assessed at 1,360 tonnes. In a second gillnet fishery, 175 gillnets hauled 357 tonnes from subareas 7-18, 7-19 and 7-20.

Three roe-on-kelp licence holders operated in the Central Coast (Areas 6, 7 and 10) this season, producing a total of 20,716 kg of product.

There were no food and bait herring fishery landings recorded from the Central Coast this year.

Other Fisheries

The Central Coast's geoduck fishery produced a catch of approximately 450,000 kg, with the majority of the effort in Area 7. As with last year, there were some problems with spoilage of this product because fishermen failed to get it to processing plants in time.

Table 40

KITIMAT DISTRICT

1982 Commercial Herring Catch (tonnes)

	Seine	Gillnet	Total[1]
Statistical Area 6 (Butedale)			
Food & Bait	0	0	0
Roe	0	369	369
Statistical Area 7 (Bella Bella)			
Food & Bait	0	0	0
Roe	2,381	3,418	5,799

1 There were no trawl fisheries in this District.

Table 41

KITIMAT DISTRICT

1982 Herring Spawn Deposition*

(standard square metres x 1,000)

Area	1982	1981
6	424.09	490.06
7	1,546.45	1,072.67
8	190.40	164.40
9	54.02	2.86
10	181.84	13.91

* The 1981 figures in this table are the final data compiled by the Field Services Branch; they do not in all cases correspond with the data published in the 1981 FSB Review.

In 1982, 23,643 kg of abalone were commercially harvested from Area 6, with an additional 1,164 kg taken from Area 10. This total (24,807 kg) is approximately 27 percent of the coastwide catch of 90,720 t, down from the 41 percent of coastwide catch recorded in 1981.

A fishery officer inspects a catch of euchalons from the Kildala River.

Table 42

KITIMAT DISTRICT

1982 Habitat Protection Referrals

Type	Number
Water Licences	15
Forestry	109
Navigable Waters Protection Act	7
Land Use Applications	24
Urban Development	1
Ocean Dumping & Dredging	1
Pollution Control Board:	-
Pesticides	3
Waste Management	6
Highway Development	3
Placer Mining	2
Other	-
Total	171

Habitat

Habitat protection activities occupy a major portion of fishery officer time. This work is mainly related to the forest industry--of the 171 habitat referrals submitted to District 7, 109 dealt with logging. The poor market conditions in 1982 resulted in a decline in number of referrals received in the latter half of the year.

Construction in the Kitimat industrial corridor reached its peak in 1982. The Canadian Celanese Corp. methanol tank farm and Ocelot Industries Ltd. methanol plant were operational in late July. Product is shipped from Kitimat on tankers via Ocelot's dock facilities.

Alcan's aluminum smelter in Kitimat continues to operate at capacity, despite a somewhat depressed world aluminum market.

Eurocan's pulp mill also continues to operate at capacity, although the mill temporarily stopped its operations to reduce existing inventories.

Enforcement

Enforcement activities in the Kitimat District increased this year with the filling of staff vacancies and the addition of a sport fish officer in the Kitimat region. In 1982, 81 sport fishery and 18 commercial charges were processed.

Of these charges, Area 6 accounted for 81 sport fishery charges and two commercial charges, Area 7 for nine commercial charges, Area 8 for one commercial charge, and Area 10 for six commercial charges.

In Area 7, two charges were laid in 1982 for dumping herring carcasses into waters of Clayton Pass. One charge, against the Central Native Co-op, resulted in a $ 500 fine, and another, against the manager of the Co-op, resulted in a $ 250 fine.

At the end of 1982, several charges were pending against two Kitimat firms; against Eurocan Pulp and Paper Co. Ltd., concerning a spill of a suspected toxic substance, and against Ocelot Industries concerning a spill of

180,000 litres of cleaning effluent. This latter charge is a joint investigation between the Department of Fisheries and Oceans and the provincial Fish and Wildlife Branch.

Sportfish violations in Area 6 were divided fairly evenly between tidal and non-tidal waters. The most prevalent charge (23 counts) in tidal waters was failing to record chinook salmon on the sport fish licence. In this area, with a high catch per unit effort and with a high percentage of those persons charged being frequent users of the fishery, the reason would seem to be attempting to exceed the 30 chinook per year limit.

In non-tidal waters, the most common charge was retention of pink salmon (8 counts). In some of those cases, the reason was the inability, or lack of attempt, to identify the fish. But in at least one case, a deliberate attempt was made to retain pink salmon.

Salmonid Enhancement

Construction on the Kitimat hatchery facility continued through 1982. It is expected to be completed in late August, 1983. Juvenile releases from its pilot hatchery operation in 1982 were 160,000 chinook, 30,000 chum, 55,000 coho and 26,000 steelhead.

A total of 1.1 million chum eggs was taken for the McLoughlin Bay hatchery (Bella Bella) this season, with 600,000 egg survival (40 percent) to date.

An Employment Bridging Assistance Program--a joint Employment and Immigration/Department of Fisheries venture established creel census and stream clearance programs in various regions in the Central Coast. This program created employment for some people who had been receiving unemployment insurance benefits.

Contact: W.H. McKenzie,
District Supervisor,
Kitimat.

Queen Charlotte District

The Queen Charlotte Islands' diverse topography, low population, and distance from the mainland provide the backdrop for a diverse variety of fisheries activities. Patrol boats operate out of Masset and Queen Charlotte.

Fishery officers are located in Masset, Queen Charlotte and Sandspit.

Commercial Salmon Fishery

The interception fisheries at Langara Island and Rennell Sound were curtailed and a ceiling was put on the catch of chinook as part of the overall chinook conservation strategy. Neither fishery produced outstanding sockeye or pink catches, and it was difficult to keep down the chinook catch in Area 1.

No local pink fisheries occurred this year, contrary to pre-season expectations. Chum fisheries were conducted over part of the west coast to sample stock strength, and later in Skidegate Inlet and Tasu Sound, on selected strong returns. Chinook catches by the troll fleet were moderate, and coho fishing was poor throughout. The two-week troll closure in June significantly affected the large troll fleet operating out of Masset.

Sport Fishery

Tidal sport fishing was outstanding this year, with total catches more than double last year's catch. Overall fishing effort for chinook is still fairly low, despite 7 - 9 kg average sizes, but fishing effort for coho continues to climb. Non-tidal fishing was poor due to dry weather conditions, although numbers of local and tourist fishermen are increasing rapidly. All rivers on the Islands have a single-hook only regulation to protect pink and coho.

Table 43

QUEEN CHARLOTTE DISTRICT
1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 1 (Masset Subdistrict)					
Sockeye	710	60,237	15,063	76,010	28,500
Coho	106	7,822	130,325	138,253	35,250
Pink	15	6,876	71,957	78,848	211,250
Chum	226	13,834	7,488	21,548	70,800
Chinook	14	6,722	96,852	103,588	1,400
Steelhead	7	82	55	144	NA*
Total	1,078	95,573	321,740	418,391	347,200+
Statistical Area 2W (West Coast Q.C.I.)					
Sockeye	0	13,259	7,004	20,263	3,831
Coho	53	2,681	38,390	41,124	856
Pink	66	4,345	8,207	12,618	112,492
Chum	1,056	58,118	1,102	60,276	93,465
Chinook	0	6,700	43,072	49,772	0
Steelhead	0	18	150	168	NA
Total	1,175	85,121	97,925	184,221	210,644+
Statistical Area 2E (East Coast Q.C.I.)					
Sockeye	719	178	11,032	11,929	1850
Coho	137	20	103,422	103,579	37,059
Pink	29	70	18,136	18,235	166,796
Chum	14,816	5,674	696	21,186	201,556
Chinook	95	0	25,761	25,856	0
Steelhead	0	0	53	53	NA
Total	15,796	5,942	159,100	180,838	407,261+

* Not available.

Table 44

QUEEN CHARLOTTE DISTRICT

1982 Sport Fish Catches*

Species	Tidal	Nontidal
Sockeye	3	NA
Coho	6,905	2,660
Pink	1,220	NA
Chum	153	NA
Chinook	2,771	NA
Steelhead	NA	NA

* Estimates only. NA means "not available."

Table 45

QUEEN CHARLOTTE DISTRICT

1982 Indian Food Fish Catches

Species	Catch
Sockeye	8,880
Coho	275
Pink	75
Chum	825
Chinook	350
Steelhead	258
Total	10,663

Indian Food Fishery

The Indian food fishery is a small but important fishery. It revolves around several local sockeye stocks, some passing sockeye, and local chum. Roe-on-kelp, abalone, and halibut are also very significant in the food fishery.

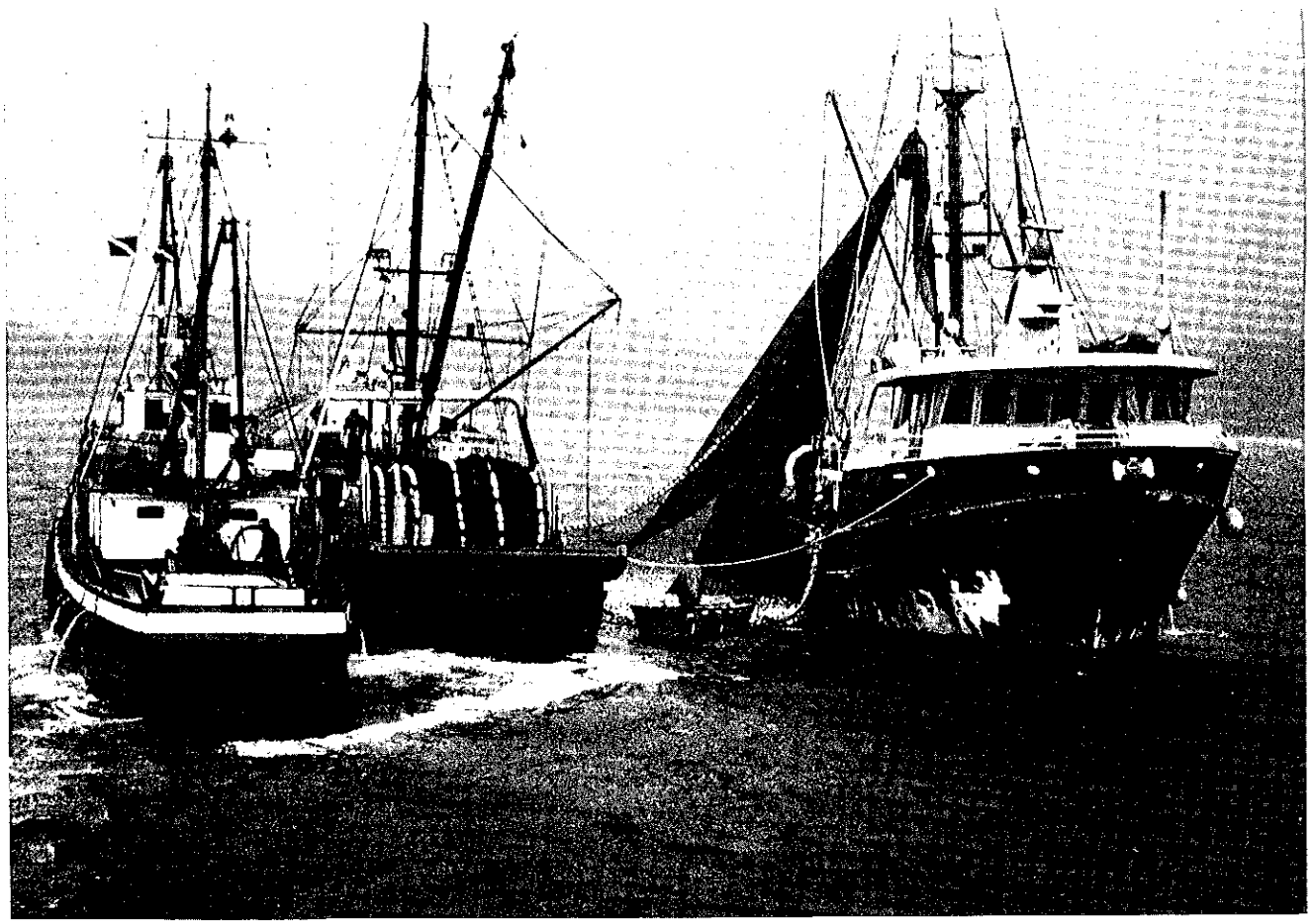
Salmon Escapements

Although this was a pink cycle year, returns on the whole were poor. By contrast, chum returns were good despite a severe flood in the major brood year 1978. Little information is available on coho escapements. Expected chum returns to the Pallant Creek hatchery did not materialize this year. Yakoun River chinook showed some encouraging increase in response to several years on conservation closures.

Herring Fishery

Spawn deposition on the east coast was good to excellent, while light in places on the west coast. A significant spawn occurred for the second year in a row in the Port Louis area on the west coast.

Eleven roe-on-kelp licences operated on the east coast. A pond survey was conducted on the licence operators, and all operators utilized the open pond system.



The herring fishery in Juan Perez Sound, Queen Charlotte Island.

Table 46
QUEEN CHARLOTTE DISTRICT

1982 Commercial Herring Catch (tonnes)

	Seine	Gillnet	Total[1]
Statistical Area 2W (West Coast Q.C.I.)			
Food & Bait	0	0	0
Roe	1,297	0	1,297
Statistical Area 1 (Masset Subdistrict)			
Food & Bait	50	0	50
Roe	0	0	0
Statistical Area 2E (East Coast Q.C.I.)			
Food & Bait	100	0	100
Roe	2,510	1,541	4,051

[1] There were no trawl fisheries in this District.

Table 47
QUEEN CHARLOTTE DISTRICT

1982 Herring Spawn Deposition*

(standard square metres x 1,000)

Area	1982	1981
1	110.87	39.36
2E	1,224.00	1,517.98
2W	550.79	211.71

* The 1981 figures in this table are the final data compiled by the Field Services Branch; they do not in all cases correspond with the data published in the 1981 FSB Review.

Other Fisheries

Seven abalone vessels took approximately 20 percent of the total coastwide quota. Halibut fishermen landed very good catches, despite poor weather and low prices. Ten vessels participated in the crab pot fishery off Masset, though catches were generally poor. A small amount of razor clams were sold as bait for the crab fishery. Small amounts of beach-collected octopus were sold as bait to halibut fishermen.

Enforcement

One commercial and five sportfishing charges were processed in the District this year. Convictions were obtained on all charges.

Habitat

The pilot mill of Cinola gold mine near the Yakoun River completed its operation during 1982. The mill is now partly disassembled and all exploration activity has ceased in the claim area. At this time, phase II of the environmental report has not been submitted; therefore, the company's intentions to resolve the major problems of tailing waste disposal are not known. No start-up date for resumption of full operations has yet been announced.

The South Moresby Wilderness Planning Team has completed its report preparation for recommendations to the provincial government regarding land use in the region of South Moresby Island. Key sections provided by the Fisheries district representative included a freshwater habitat evaluation of the four land-use options and a proposed strategy for DFO management in the marine zone adjacent to the park. The draft report will be presented at a series of public meetings during March and April of 1983.

The economic downturn resulted in a suspension of all major forestry developments such as mainline road construction and conversion to dryland sorts. Heavy emphasis was placed on harvesting areas with existing roads and short hauling distances to water sites. In some cases, this included areas which had been previously deferred, resulting in some interagency conflict.

The Fish/Forestry Interaction Program has entered its preliminary report stage on its investigation into landslide processes and stream impacts. The program began in 1981 to resolve the questions raised as a result of alleged damage to fish habitat from landslides off steep slopes.

Table 48

QUEEN CHARLOTTE DISTRICT

1982 Habitat Protection Referrals

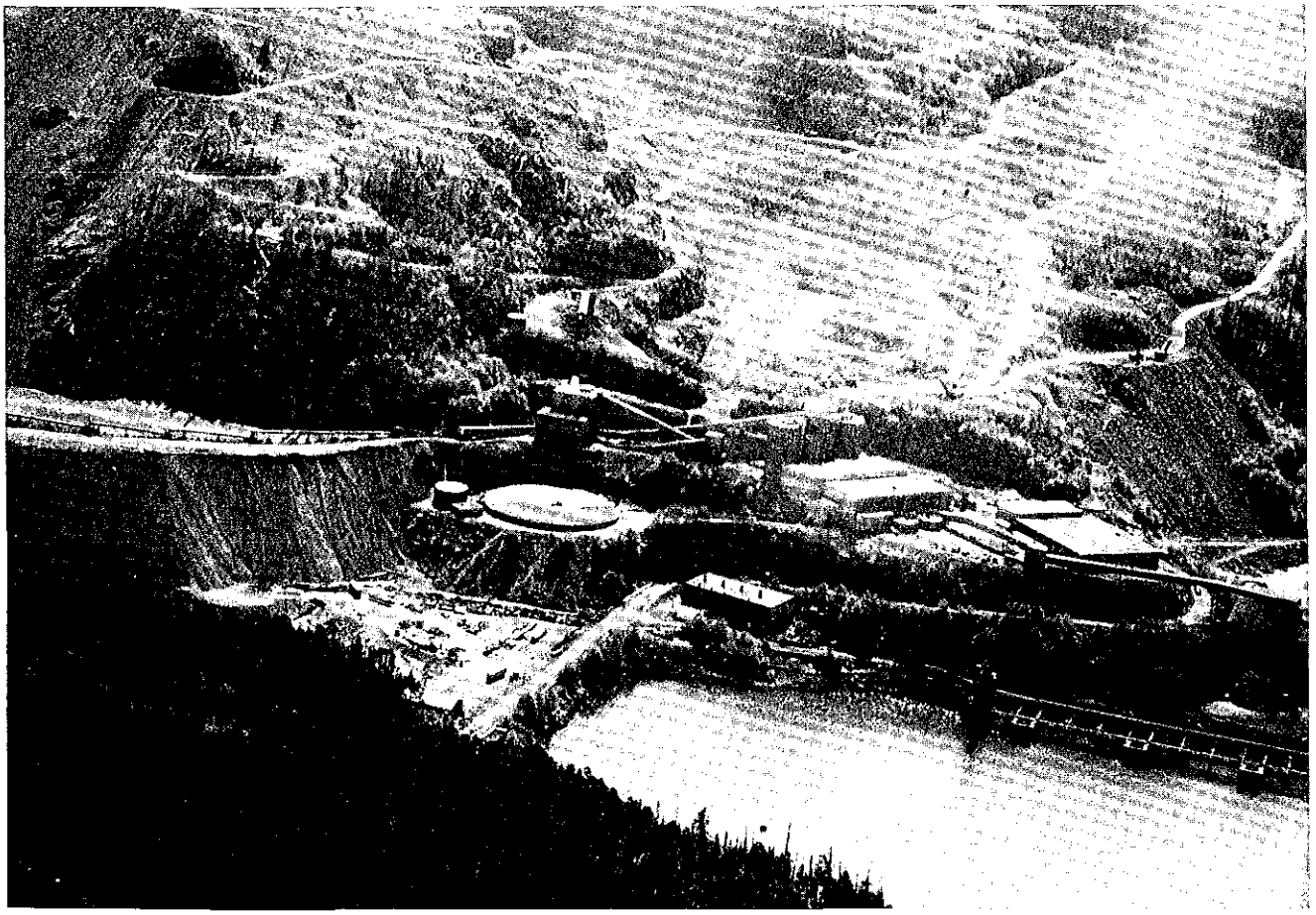
Type	Number
Water Licences	18
Forestry	98
Navigable Waters Protection Act	3
Urban Development	6
Pesticide Application	8
Waste Management	4
Ocean Dumping & Dredging	2
Land, Lease and Foreshore Leases	32
Mineral Development	24
Salmon Enhancement	18
Total	213

Salmonid Enhancement

Enhancement activities cover a diverse range of methods and many local people are involved.

Public involvement incubation boxes are producing mainly coho and chum fry. Under SEP's Community Economic Development Program, the Masset Indian Band operates a chinook - coho - sockeye facility on the Yakoun River. Both Pallant Creek chum hatchery and Mathers Creek pilot chum hatchery experienced difficulty obtaining brood stock due to poor adult returns, but 7 million chum fry were released from Pallant seapens earlier in spring.

Contact: Chris Dragseth,
District Supervisor,
Queen Charlotte City.



The Tasu mine, on the west coast of Moresby Island (Queen Charlotte Islands), is closing down in October 1983.

Prince Rupert District

The Prince Rupert District is the most northerly coastal district in the Pacific Region. On the coast, it extends from the southern tip of Banks Island (Grenville-Principe subdistrict) in the south to the Alaska/B.C. border in the north. Inland, it includes the Nass River and Skeena River watersheds.

The major population centers are Prince Rupert, Terrace, Smithers and Houston. There are also numerous small centers and native communities throughout the District.

Commercial Salmon Fishery

The 1982 return of sockeye to the Skeena River, totalling 3.37 million fish, was the largest since accurate catch and escapement records began in 1940. The net fishing fleet caught 2.1 million Skeena-bound sockeye in Areas 3, 4 and 5; these fish weighed an average of three kilograms each. The 1982 run consisted of 82 percent five-year-olds and 15 percent four-year-olds; the remainder were in other age classes.

The seine catch of sockeye in Area 4 was also the largest on record. The Nass River net sockeye catch of 245,000 fish came from a total return of

Table 49
PRINCE RUPERT DISTRICT
1982 Commercial Salmon Catch and Escapements

Species	Gillnet	Seine	Troll	Total	Escapement
Statistical Area 3 (Lower Nass)					
Sockeye	232,959	415,306	5,356	653,621	280,000
Coho	17,908	51,294	53,094	122,296	32,605
Pink	59,178	970,445	30,553	1,060,176	431,435
Chum	18,122	38,530	963	57,615	29,775
Chinook	7,232	28,021	9,022	44,275	6,375
Steelhead	1,618	2,484	18	4,120	NA*
Total	337,017	1,506,080	99,006	1,942,103	780,190+
Statistical Area 4 (Lower Skeena)					
Sockeye	1,184,729	427,678	6,019	1,618,426	1,140,329
Coho	28,892	19,975	35,396	84,263	16,555
Pink	138,926	108,827	12,644	260,397	710,300
Chum	17,908	11,752	604	30,264	4,375
Chinook	9,196	15,717	9,155	34,068	16,725
Steelhead	9,675	916	7	10,598	NA
Total	1,389,326	584,865	63,825	2,038,016	1,888,284+
Statistical Area 5 (Grenville-Principe)					
Sockeye	31,918	38,510	6,210	76,638	19,450
Coho	7,927	2,054	23,962	33,943	620
Pink	18,940	39,676	4,529	63,145	70,300
Chum	9,037	2,890	79	12,006	7,370
Chinook	382	1,183	4,893	6,458	0
Steelhead	39	226	3	268	NA
Total	68,243	84,539	39,676	192,458	97,740+

* Not available.

525,000 pieces. The 10-year average return is 418,000.

In an effort to increase chinook and steelhead escapement to the Skeena, breaks in fishing effort were utilized. No more than three consecutive fishing days were scheduled, with a minimum of two non-fishing days between openings.

There was a strong return of pink salmon to the Nass River. A catch of more than one million pieces was recorded, and the escapement was almost double the 10-year average. The average run of pink salmon to the Skeena was less than predicted; therefore, there were no net fishing openings for this species. The chum return was weak in all northern subdistricts, and this was reflected in both the catches and escapements. The Area 3 escapement of 20,000 fish was only one-third of the 10-year average.

Chinook and coho catches were good in the net fisheries, but escapements were generally poor.

A relatively strong steelhead run yielded high catches in the Areas 3 and 4 net fisheries, and a higher escapement than the recent years' average was achieved in the Skeena system.

A troll closure was in effect from June 10 - 24 in an effort to increase coastal chinook escapements. Troll figures are not available at this time.

Sport Fishery

In 1982, there was an increase in sport fishing activity in the coastal areas of District 8. This was probably due to the extensive layoffs in the wood industry and the addition of construction crews to the Ridley Island projects.

A sport fishing advisor was appointed for the northern regions, in an effort to improve communications with the sport fish community.

Although the chinook escapement was down again in 1982, the tidal sport fish catch appeared to be much higher than the previous year. Within Area 4, Prince Rupert Harbor and Stewart, fishing in the early months of the year produced fair catches of chinook weighing between 4.5 - 9 kg each.

There was good return of sockeye to Shawatlan Creek, resulting in a targetted sport fishery at the creek mouth. When jigging became a problem, the boundary was moved seaward.

With adverse weather conditions and high waters during the fall months, the coho catch was down considerably over previous years. When the weather did permit small crafts to leave various harbors, coho fishing was excellent.

The non-tidal sport fishery on the Skeena River and its tributaries continue to increase by leaps and bounds. The principal fisheries are for chinook during the early summer months and coho and steelhead in September and October. A large steelhead fishery is also developing during November and December, lasting until freeze-up and continuing in the early spring, prior to steelhead spawning During July and August, there are often up to 1,000 anglers per day along the banks of the Skeena River.

With the advent of jet-powered boats, even the smaller tributaries have become "river highways." During peak fishing periods, there may be up to 50 - 60 boats.

Although the effort is intense, the catch rate is low, mainly due to declining chinook stocks. It is estimated that more than 100 angler-hours are required to catch a large chinook (more than 14 kg).

Coho stocks have not declined as rapidly as chinook and the effort to catch coho is somewhat better. Water levels during late fall dictate angling productivity somewhat and helps protect

declining stocks.

A creel census carried out in the Terrace area, from July 4 - Sept. 24, gathered some valuable information on catches and fishing effort.

Table 50
PRINCE RUPERT DISTRICT
1982 Sport Fish Catches*

Species	Tidal	Nontidal
Sockeye	800	0
Coho	1,400	2,500
Pink	750	0
Chum	0	0
Chinook	2,700	2,650
Steelhead	0	685+

* Estimates only.

Indian Food Fishery

An increase in effort and catch was noted in both the tidal and non-tidal Indian food fisheries, probably an indicator of the difficult economic times as well as the general high numbers of sockeye. For the most part, band councils assumed the responsibility of issuing food licences to band members. An experimental fish trap was utilized with some success at Moricetown Canyon in an attempt to find an acceptable alternate to the gaff fishery.

A number of food-fishing-related charges were laid, mostly dealing with cases of suspected illegal sale.

Table 51
PRINCE RUPERT DISTRICT
1982 Indian Food Fish Catches

Species	Catch
Sockeye	240,000
Coho	28,500
Pink	39,000
Chum	1,450
Chinook	13,200
Steelhead	3,000
Total	325,150

Herring Fishery

Herring soundings in the Port Simpson and Kitkatla areas failed to identify stocks in excess of spawning requirements and no roe fisheries were held this year.

Nine roe-on-kelp licence holders fished with generally good success, producing a total of 57.3 tonnes of product of high quality.

Five 45.3-tonne bait pond permits were issued in the spring, following the spawning season. None of the small northern food and bait quota was taken from District 8 this fall.

Table 52
PRINCE RUPERT DISTRICT
1982 Commercial Herring Catch (tonnes)*

* There were no herring fisheries in this District in 1982.

Table 53
PRINCE RUPERT DISTRICT
1982 Herring Spawn Deposition*

(standard square metres x 1,000)

Area	1982	1981
3	28.18	291.16
4	727.12	565.36
5	359.75	410.23

* The 1981 figures in this table are the final data compiled by the Field Services Branch; they do not in all cases correspond with the data published in the 1981 FSB Review.

Salmon Escapements

With the exception of sockeye, steelhead and some pink stocks, escapements were generally disappointing. The Babine sockeye escapement of 1.2 million was above optimum for the second straight year. Some gains are evident in the early timing stocks. The upper Skeena sockeye, however, remained well below the required

level. Coho in general showed below average strength on the spawning grounds, although the confidence level in coho figures is low. Pink salmon escapements were good in most areas and were double recent years' average in the lower Nass. Chum escapements, with the exception of Area 5, were low and extremely low in the lower Nass. Chinook escapements with few exceptions, remained low throughout the District.

Habitat

Industrial development in the Prince Rupert area dominated the habitat scene, with staff heavily involved in referrals for the Grassy Point (Dome Petroleum) and Ridley Island (coal and grain ports) megaprojects. Construction is well underway at Ridley Island, with very few environmental problems noted to date. Pending final approval of the project, construction of the liquefied natural gas plant at Grassy Point near Port Simpson is likely to begin in 1984.

Logging in the coastal areas is at a very low level. The Watson Island pulp mill had extensive shut-downs, the results of high costs and soft markets. Interior logging fared somewhat better, although many sawmills had market-related shut-downs. Infestations of pine bark beetles in the Babine watershed are causing the B.C. Ministry of Forests to press for accelerated rates of cut in an attempt to contain the spread of the beetles. Uncontrolled infestation could have detrimental effects on the Babine watershed.

The mining industry also experienced economic problems. Some mines, including the controversial Amax Kitsault molybdenum mine, the Bell Copper and Noranda mines were forced to curtail operations. Concern was raised over acid generation from the Equity silver tailings near Houston and the release of cyanide from the Scotty gold mine near Stewart.

Building "steps" to facilitate fish passage to an improperly placed culvert on Chicago Creek, Hazelton.

Other areas of concern include the upgrading of highway and railroad systems adjacent to the Skeena River. The Department of Highways has undertaken a program to compensate for habitat lost due to filling along the river bank. The specifics of this program are not available at this time.

Table 54

PRINCE RUPERT DISTRICT
1982 Habitat Protection Referrals

Type	Number
Water Licences	61
Forestry	158
Navigable Waters Protection Act	8
Land Use Applications	62
Urban Development	19
Ocean Dumping & Dredging	5
Pollution Control Board:	
Pesticides	15
Waste Management	17
Highway Development	9
Placer Mining	2
Other	73
Total	429

Enforcement

A total of 91 persons were charged with offences in District 8 in 1982. Guilty pleas were entered by 62 persons, five charges were stayed or withdrawn; the remainder are unresolved at this time. Penalties have ranged from probation to a number of hours of community service work to fines of up to $2,000. Most fines levied ranged from $25 to $200.

Illegal activity was noted mainly in the following areas: commercial fishing boundary violations, sport fish violations (abalone in tidal waters and possession of pink and sockeye salmon from non-tidal waters) and Indian food fish violations.

Contact: Gus Jaltema,
District Supervisor,
Prince Rupert.

Management Biology

Docee Fence Adult Enumeration

The adult sockeye return to Long Lake in Smith Inlet is counted through a "fence" on the Docee River, the outlet of Long Lake. The strength of the returning sockeye stock is estimated by the size and timing of the run through the fence. The regulation of the Smith Inlet sockeye fishery is based on these estimates. An excellent return of predominantly five-year-old sockeye provided an escapement of 215,000 and a commercial catch of 286,000.

Rivers Inlet Echosounding

Adult sockeye returning to Rivers Inlet generally hold at the head of the inlet prior to moving into the lake. The daily pattern of sockeye buildup is estimated by echosounding along a prescribed grid. The openings for the commercial sockeye fishery are determined from the size and timing of the returning stock, as estimated from the echosounding program. However, in 1982 the fish moved into Owikeno Lake without holding in the inlet, thus a complete estimate of the escapement was not possible.

Owikeno Lake Adult Spawner Survey

Each fall, inspections are made of all the stream and lake spawning areas in Owikeno Lake. Representatives from industry also participate in this survey, which forms the basis of the escapement estimate for Rivers Inlet sockeye. The sockeye escapement to Owikeno Lake was estimated at 823,000 fish, which equals the 1981 escapement and is well in excess of the 10-year average. The optimum escapement for this system is one million fish.

Atnarko Tower Count

The Atnarko Tower count provides daily estimates of escapements of adult pink salmon to the Atnarko River (Bella Coola system). In 1982, the program was ably run through the job creation program. The escapement of 125,000

pink salmon was disappointing, but within the expected range.

Contact: Dave Peacock,
Management Biologist,
Central Coast.

Skeena River Test Fishery

The Skeena River test fishery was established in 1956 to provide a daily estimate of sockeye and pink escapements beyond the commercial fishery boundary. This information was considered essential for the effective management of these stocks. Indices for coho, chum and steelhead are also calculated to determine timing and relative abundance. All species are sampled for age, length, sex and size to fulfill requirements for both short-term management and longer-term data inventory requirements.

Nass River Test Fishery

During the early 1960s, assessment of the strength of the Nass sockeye stock became even more difficult as the mobility of the fleet increased and as greater fishing pressure was exerted at greater distances from the historical estuarine area. Since 1963, a test-fishing operation has been conducted near the upriver fishing boundary. The test fishery is designed to provide a daily index of sockeye escapement from the fishing area. The data obtained from this operation, in addition to estimates of commercial catch in the estuarine region, provide a complete picture of the strength of the run as it develops each year. The ability to approximate the escapement on a daily basis as soon as it has left the fishery is an extremely valuable aid to the precise regulation of the fishery.

Table 55

Accuracy of Skeena Test Fishing Index

Year	Estimated (X 1000)		Actual (X 1000)		% Error	
	Sockeye	Pink	Sockeye	Pink	Sockeye	Pink
1969	681	917	704	873	3.27	-5.04
1970	641	912	722	923	11.22	1.19
1971	806	961	885	1,090	8.93	11.83
1972	739	650	742	1,672	0.40	61.12
1973	1,197	855	962	1,251	-24.43	31.65
1974	970	343	792	314	-22.47	-9.24
1975	902	879	910	1,822	0.88	51.76
1976	628	514	658	597	4.56	13.90
1977	962	934	1,041	962	7.59	2.91
1978	669	837	526	703	-27.19	-19.06
1979	1,061	517	1,294	510	18.01	-1.37
1980	917	627	704	765	-30.26	18.04
1981	1,064	883	1,565	1,132	32.01	22.00
1982	1,158	438	1,315	710	11.94	38.31
				Average	±14.51	±20.33

The 1982 season was the first full season without road access, as both the Ishkeenickh and Monkley Bridges gave way in July 1981. Fish caught during the operation were delivered to Prince Rupert once a week by the test fishing boat. The missing daily index was estimated by interpolating the indices of the day before and the day after the delivery run.

Table 56

Relationship Between Annual Nass River Test Fishing Index of Sockeye Spawning Escapement and Recorded Annual Spawning Escapements 1963 - 1982

Year	Predicted Escapement*	Recorded Escapement	Percent Error
1963	-	unknown	-
1964	134,890	153,500	12.1
1965	111,405	127,000	12.3
1966	90,990	99,000	8.1
1967	95,360	76,700	-24.3
1968	132,730	110,000	-20.7
1969	-	182,100	-
1970	115,396	110,754	-4.2
1971	145,180	244,674	40.6
1972	94,072	175,866	46.5
1973	262,625	283,672	7.4
1974	175,610	193,203	9.1
1975	118,668	73,582	-61.3
1976	167,068	141,305	-18.2
1977	256,454	400,371	35.9
1978	148,335	144,610	-2.6
1979	182,418	212,920	14.3
1980	151,704	155,521	2.6
1981	232,608	255,668	9.0
1982	250,032	290,000	13.8
			±19.1

* Predicted escapement for 1964-1968 based on 1:500, 1970-1972 on 1:400, 1973-1978 based on 1:550, 1979-1982 based on 1:600

Babine River Counting Fence Adult Enumeration Program

The Babine Lake system produces more than 90 percent of the sockeye salmon for the Skeena river watershed. The Babine River counting fence (established in 1947), near the outlet of Babine Lake, provides one of the best estimates of adult salmon escapements on the Pacific coast. It also serves as an invaluable calibration of the Skeena River test fishery.

The adult enumeration program was conducted from July 9 - Sept. 27. In addition to the normal counting operation, tags were recovered from the international tagging program with the help of some of their staff. This was the first year of a joint U.S./Canada research program designed to determine interception rates in certain key fisheries.

This was the second consecutive year, and the third time in the last four years, that more than one million large sockeye passed through the counting fence. The optimum escapement to this system is estimated to be around 0.85 million.

There was no native fishery in 1982 due to the poor return of jack sockeye. The final year of a three-year tagging program designed to determine the timing of the various substocks past the fence was completed in 1982. The results should be available by mid-1983.

Smolt Enumeration Program

Using a modified mark-recapture method, the smolt migration out of Babine Lake has been estimated annually since the early 1960s. The 1982 program commenced on May 14 and continued until June 12; 74,500 smolts were tagged and released. The total smolt output of 130.7 million is the second highest on record, and it comes from a very poor brood year spawning escapement. The data are useful in assessing the productivity of Babine Lake as well as in forecasting future returns.

Meziadin Fishway and Nass Survey

The Meziadin fishway was built in 1966 to help the sockeye migration bypass a series of falls. It also provides a convenient facility for enumeration of the sockeye run on its way into Meziadin Lake. To a lesser degree, chinook and coho stocks are also enumerated.

The 1982 enumeration ran from June 29 - Sept. 13. The fishway was manned by a job creation crew as part of the recovery portion of the international tagging program.

Sockeye spawning estimates for Bowser Lake are made by analyzing scale data from Bowser Lake, Meziadin Lake and the Nass River test fisheries. The 1982 results should be available in early 1983.

Contact: Ron Kadowaki,
Nass/Skeena Management
Biologist.

Queen Charlotte Islands

The waters surrounding the Queen Charlotte Islands support local pink and chum salmon net fisheries as well as a major north coast troll fishery. The latter targets on migrating stocks of chinook salmon of mixed origin, including Alaska, north and central B.C., southern B.C., Washington and Oregon stocks. Coho stocks of primarily northern B.C. origin are caught. A sockeye interception net fishery occurs in July and early August in the Rennell Sound and Langara Island area.

In 1982, the timing of the sockeye fishery was studied in an attempt to minimize the incidental chinook catch, which has escalated in recent years. To rehabilitate coastal chinook stocks, a two-week closure in the north coast troll fishery and chinook quotas for the sockeye interception net fisheries of Area 1 and Area 2W, the north and west coast of the Queen Charlotte Islands, respectively, were implemented in 1982. Further conservation measures are anticipated in coming years.

QCI Test Fishing

In 1978, Japanese-style chum salmon enhancement was initiated on Pallant Creek near Moresby Camp, Cumshewa Inlet, to provide more fish to the historical fall chum fishery on the Queen Charlotte Islands. In order to manage this enhanced stock effectively, a two-year tagging study was completed in 1980-81 to identify the timing and mixing of Pallant Creek chums relative to other chum stocks and species of salmon in and around Cumshewa Inlet.

Preparatory to the first dominant four-year-old enhanced chum returns of 1982, test fishing was initiated in Cumshewa Inlet for the purpose of:

- establishing standard gillnet index sites
- confirming the origin of stocks from these sites with complementary tagging information
- investigating (through the use of a seine test vessel) the success of echosounding and mark-recapture sampling techniques in estimating stock size within the salmon holding area at the head of the inlet prior to upstream migration and fence enumeration.

Because of the unexpectedly small pink and chum salmon returns to Cumshewa Inlet in 1982, echosounding did not prove feasible; however, gillnet catch per unit effort (CPUE) correlations with fence escapement counts may prove to be a useful index of chum salmon abundance for future investigation. The CPUE and mark-recapture sampling results and the tag recovery information require further analyses before recommendations for next year's program can be finalized.

Contact: Lynda Orman,
Management Biologist,
Queen Charlotte Islands.

Geoduck Fishery

The 1982 commercial geoduck fishery was open from January to September, with a coast-wide quota of 2,984,350 kg (615 million pounds). Approximately

450,000 kg (about one million pounds) were taken from the North Coast, with the majority of this harvested from Area 7.

Abalone Fishery

In 1982, the commercial abalone season ran from Feb. 15 to Dec. 15. in 1982, each licenced abalone vessel was assigned a vessel quota of 3,629 kg (8,000 lbs). The coast-wide allowable catch was set at 94,347 kg (208,000 lbs) of which 78,102 kg (172,186 lbs) were harvested. The catch was equally distributed geographically with 34 percent of the catch from the Queen Charlotte Islands, (Areas 1, 2E, 2W), 32 percent from the Central Coast (Areas 6, 10) and 27 percent from the South Coast (Areas 11, 12, 20, 23, 24, 27). The single-largest producing statistical area was Area 6 which produced 31 percent of the catch.

An annual meeting with abalone licence holders was held in December 1982 to discuss management plans for the 1983 season and review the previous year's fishery.

Spawn-on-Kelp Fishery

Since 1975, a spawn-on-kelp fishery has been conducted on the B.C. coast. Ripe herring are caught by seine and then relased in a net enclosure where kelp, attached to strings, has been suspended. Herring deposit eggs on the kelp and when the desirable egg coverage is obtained, the kelp is removed, packed in totes with salt, and shipped to plants for final processing.

In 1982, 28 licences were issued and each licence holder was permitted to produce 7.26 tonnes of net product weight. The 146.2 tonnes landed in 1982, although slightly less than that landed in the previous year, continued the high production observed in recent years.

A monitoring study in 1982 indicated that high mortality of herring was experienced in many of the net enclosures. It was concluded that the mortality was due to overloading of the ponds.

Contact: Paul Sprout,
Senior Management Biologist,
North Coast Division.

Northern Inspection District

The Northern Inspection District encompasses the area north of Cape Caution to Portland Canal and from the Queen Charlotte Islands inland. Eleven fish processing plants operate in this District. This is a decrease from previous years, due to the amalgamation of B.C. Packers' processing operations into one facility--Prince Rupert plant. The Prince Rupert plant commenced operations in March 1982, and with eleven canning lines, it is the largest salmon cannery in the world. One month later, B.C. Packers closed down its Rupert cold storage plant in Seal Cove.

In 1982, product certification played a large role in the Northern Inspection District; staff conducted 276 inspections, representing 3,696,205 kg of fish products.

The canned salmon botulism incident, along with the 1982 labor dispute during the canning season, resulted in the 1982 canned salmon pack being half that of the previous year's production. Due to international health concerns, Inspection drastically increased its in-plant monitoring of the canneries and spent considerable time toward defect analysis at B.C. Packers' canwarehouse, Canol Dock. Prior to release, DFO requires that all canned salmon undergo double-dudding and check-weighing to screen for defective cans.

The effects of the recession were evident in the fishing industry during 1982, resulting in a decrease or end of

certain processing activities. B.C. Packers, the only holder of a clam permit in the north, did not process butter clams in 1982. Total groundfish landings in 1982 were approximately half that of 1981--only 7,428 tonnes were landed. B.C. Packers ceased its groundfish operation upon closure of the Rupert cold storage plant and Royal Fisheries elected not to process groundfish in the 1982 season.

The food and roe herring fisheries ran smoothly during 1982. A reduced quota of 272.1 tonnes for food herring gave Inspection officers ample time to monitor landings and to apply the proposed standards developed for food herring and fillets under the Fish Quality Improvement Program.

Northern Inspection District can anticipate an increase in workload, should the development of processng plants in Masset, Port Clements, Queen Charlotte City and Prince Rupert proceed as planned.

Contact: Lesley Pozer,
Fish Quality Specialist,
Northern Inspection,
Prince Rupert.

Offshore

The Offshore Division was created in 1977 to develop, regulate and manage foreign and domestic fishing activity within Canada's 200-mile limit. Implicit in this mandate is a full complement of activities which has grown as the fisheries have increased and diversified.

The Division is responsible for managing the offshore and near-shore trawl and longline fisheries, and other marine fisheries, such as the sablefish trap fishery. As Canada allows foreign countries to fish stocks unharvested by Canadian fishermen, the Division must identify surplus stocks and fisheries in which a surplus has been absorbed by increased domestic fishing activity.

Other responsibilities of the Division include: establishing terms and conditions under which foreign vessels are permitted to fish in the Canadian zone, implementing an effective program of surveillance and enforcement, developing and implementing a groundfish management plan, and authorizing cooperative fishing arrangements intended to bridge the gap in the transitional stage of ending foreign involvement in the 200-mile zone.

Contact: Ed Zyblut,
Manager,
Offshore Division.

Special Programs and Management

The Special Programs and Management Unit is Offshore's "research and development" arm. The Unit designs, develops, evaluates and implements special programs to optimize the yield from offshore fishery resources. To meet this goal, the Unit conducts investigations and prepares analyses of diverse sectors of Canada's west coast fishing industry, while promoting effective business relations with these industry sectors. The Unit utilizes the research in its Regional policy papers, impact studies and contingency plans in support of international negotiations. The Unit also provides Regional input into Canada's national policy on foreign fishing within the 200-mile limit.

Highlights in 1982 included: a study of the national and cooperative hake

fisheries; preparations for possible eventual implementation of Dr. Peter Pearse's proposals for a halibut vessel quota system; a survey and report of B.C. companies that process groundfish; and research into the market potential for a B.C. seaweed harvesting and processing industry.

Contact: Barry Ackerman,
Head,
Special Programs and
Management Unit.

Offshore Operations

This Unit is responsible for monitoring foreign and domestic fishing activity for both existing and developing fisheries within the 200-mile limit. It is also responsible for coordinating the development and implementation of an annual groundfish management plan and Regional guidelines for foreign fishing vessels.

Some specific responsibilities of the Unit are:

- compiling and assessing foreign and domestic catches, with a view to implementing closures or other regulatory measures upon attainment of quotas
- preparing licences, permits and fee assessments for foreign vessels engaged in either fishing for a national allocation or in a joint-venture operation with Canadian vessels
- maintaining effective communications with other Departmental agencies, commercial fishermen, industry representatives, and foreign industry or government representatives
- evaluating and recommending changes to existing regulations and agreements pertaining to the offshore fishery.

Contact: Keni Lorette,
Head,
Offshore Operations Unit.

Offshore Surveillance and Enforcement

The Surveillance and Enforcement Unit is responsible for monitoring foreign and domestic vessel activity and for enforcing management regulations outside the surfline and inside the 200-mile limit.

In order to meet these requirements, a number of objectives were set prior to extension of jurisdiction in 1977:

- to inspect, at sea, one-third of the foreign fleet every month
- to inspect, at sea, one-sixth of the Canadian fleet every month
- to maintain a Canadian presence over lucrative fishing grounds intersected by fishing zone closure lines or the 200-mile limit
- to locate and identify (by air patrol) at least once every week, and more often in sensitive areas, every vessel fishing in offshore Canadian waters.

To attempt to meet these objectives, vessels, planes, equipment and installations operated by DFO, Department of National Defence and the Ministry of Transport are used.

Surveillance Activities

In 1982, the Department of National Defence allotted 25 sea-days to the Offshore Division for fisheries patrol.

The full allotment was utilized and DND ships, with an Offshore fishery officer on board, steamed a total of 5,748 nautical miles on fisheries patrol.

In addition to the surface vessels, DND also provides dedicated air surveillance by Tracker aircraft and multi-tasked time by the long-range Aurora. Trackers from VU33 Squadron logged a total of 520 hours and provided invaluable information on gear distribution and vessel counts. Some of

Table 57

1982 Surveillance Activities*

Country of Origin	Vessel Sightings[1] (by surface patrol)	Vessel Inspections[2] (by Offshore F/Os)	Aircraft Sightings[3]
Canada	1,111	279	407
United States	2	3	14
Japan	7	7	3
U.S.S.R.	28	31	11
Poland	54	54	31
Total	1,202	374	463

1 These figures include vessels which may have been sighted on more than one occasion.

2 These figures include multiple inspections and thus do not reflect actual vessel numbers operating in the Canadian zone.

3 A "sighting" is defined as those vessels on which the name is discernible from the aircraft. Aircraft surveillance was provided by DND Tracker, Argus and Aurora patrols. The Trackers, dedicated to fisheries patrols, flew for 519.4 hours. The multi-tasked Aurora flights compiled 404.8 hours. These figures include vessels which may have been sighted on more than one occasion.

* preliminary data.

these flights were accompanied by fishery officers, biologists or other staff to assist in familiarizing the aircraft crews with DFO requirements.

The Auroras of 407 Squadron are credited with 405 multi-tasked hours in 1982. Although it is difficult to ascertain the proportion of time dedicated solely to fisheries, the benefit is derived from the coverage obtained of the fishing zone beyond Tracker range and outside normal surface patrol areas.

The DFO headquarters' vessels Tanu, James Sinclair and Laurier provided the Offshore Division with 283 sea-days, for a total of 31,869 nautical miles. The majority of this support was logged by the Tanu and the James Sinclair, as the Laurier was retired from active service on April 1, 1982.

In addition, the DFO vessels Atlin Post, Comox Post, and Arrow Post assisted in offshore surveillance by contributing a total of 69 vessel days. Inshore fishery officers spent a total of 78 days at sea on these vessels.

During the 1982 season, officers from the Offshore Division spent a total of 291 days at sea on DFO and DND vessels. This includes 25 days which

were dedicated to inshore fisheries, such as herring and salmon, and 19 days on foreign vessels observing the hake fishery.

During the 1982 season, 25 warnings were issued and 13 charges were laid for domestic fishing violations. Four warnings were also issued, to one Japanese and three Polish vessels.

Hake Cooperative Arrangements

The cooperative fishery for Pacific hake, in which Canadian trawlers deliver to foreign processor ships, continued strongly in 1982. The first Canadian west coast fishery of this type occurred in 1978, following the establishment of the 200-mile limit in 1977. The fishery has grown substantially--it involved two Polish processors and two Canadian trawlers in 1978, and in 1982, seven Polish and four Soviet processors were supplied by 17 Canadian trawlers. Catches of hake during the same period have increased by more than ten-fold. There is every indication that this fishery, which is coordinated by the Hake Consortium of

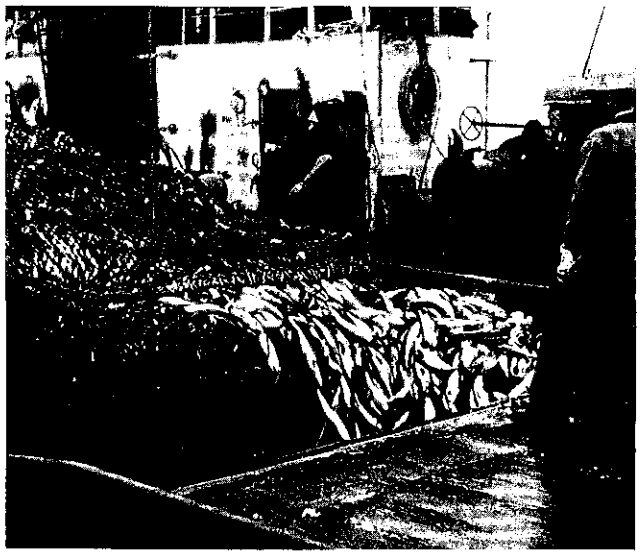
Table 58

Pacific Hake Landings*[1] in B.C. Waters (Area 3C) 1979 - 1982 (tonnes)

	1979		1980		1981		1982	
Country	**Quota**	**Catch**	**Quota**	**Catch**	**Quota**	**Catch**	**Quota**	**Catch**
National Fishery:								
U.S.S.R.	3,000	--	Supplement	140.6	--	--	--	--
Poland	6,700	4,262.7	5,000	4,943.0	8,000	2,918.4	10,000	10,356.6
Japan	6,000	3,637.3	6,000	816.9	5,000	186.7	2,500	2,237.0
Total	15,700	7,900.0	11,000+	5,900.5	13,000	3,105.1	12,500	12,593.6
Cooperative Fishery:								
U.S.S.R.	6,000	1,131.0	8,000	4,884.2	8,000	7,487.4	8,000*[2]	9,390.9
Poland	3,000	3,102.0	5,000	4,795.7	5,000	5,049.8	10,000	10,222.4
Greece	--	--	6,000	3,529.7	8,000	4,927.3	--	--
Total	9,000	4,233.0	19,000	13,209.6	21,000	17,464.5	18,000*[2]	19,613.3
GRAND TOTAL - All Fisheries:								
U.S.S.R.	9,000	1,131.0	8,000	5,024.8	8,000	7,487.4	8,000*[2]	9,390.9
Poland	9,700	7,364.7	10,000	9,738.7	13,000	7,968.2	20,000	20,579.0
Japan	6,000	3,637.3	6,000	816.9	5,000	186.7	2,500	2,237.0
Greece	--	--	6,000	3,529.7	8,000	4,927.3	--	--
Domestic	open	92.8	8,000	46.3	6,000	3,783.0	10,000	--

*1 This includes some pollock incidental catch.

*2 One Soviet vessel continued to fish under an open contract after the initial 8,000 t were taken.



A cod-end of hake is dumped aboard a Japanese stern trawler engaged in national fishing activities.

Table 59

Domestic Trawl Landings (tonnes)

Species	1982*	1981
English Sole	537	1,500
Rock Sole	681	1,059
Petrale Sole	274	290
Dover Sole	866	1,245
Rex Sole	69	190
Starry Flounder	108	198
Turbot	546	946
Other Flatfish	4	180
Pacific Cod	3,742	6,676
Lingcod	2,425	1,729
Sablefish	192	233
Pacific Ocean Perch	5,321	5,103
Other Rockfish	4,405	4,487
Misc. Species	114	264
Dogfish	1,443	637
Pollock	922	1,251
Hake	1,352	5,691
Total	23,001	31,679

* Interviewed landings and some sales slip data.

B.C., will continue to expand and grow in importance.

Cooperative fisheries have a positive effect on the domestic fishing industry for many reasons, including:

- helping to decrease pressure on traditional groundfish stocks by employing a number of the most successful Canadian trawlers
- enabling Canadian fishermen to increase their knowledge and fishing expertise on hake
- enabling the domestic processing sector to gain technical knowledge, which may lead to the development of a new domestic fishery
- aiding the Canadian economy because foreign countries involved in this fishery have contributed millions of dollars through purchases of fuel, supplies and ship repairs.

National Hake Fisheries

Under the terms and conditions of the Law of the Sea Conference, species of fish that are surplus to Canada's needs must be allocated to nations which have enjoyed traditional fishing rights within the proclaimed 200-mile limit. As a result, national allocations of Pacific hake continued in 1982, with quotas of 2,500 t to Japan and 10,000 t to Poland. Foreign fishing of this type is strictly monitored by the Surveillance and Enforcement

Table 60

Port Calls by Foreign Vessels in 1982*

Poland	44
U.S.S.R.	27
Japan	0
West Germany	1
Bulgaria	1

* Some vessels made multiple calls.

Unit and is only permitted in selected areas off the lower west coast of Vancouver Island.

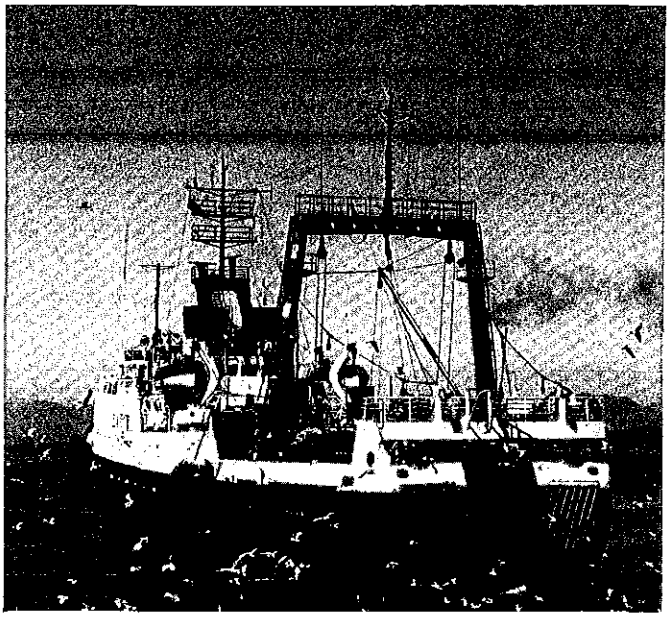
Contact: John Cairns
Head,
Surveillance and Enforcement Unit.

Operations Center

The principal responsibility of the Operations Center is to gather information relating to commercial and recreational fishing activity off the Pacific coast of Canada, and to ensure that this information is distributed to DFO staff, the fishing industry and general public.

The information includes fishing patterns or times, regulatory measures, and summary catch and effort information resulting from specific commercial, recreational and test fisheries. Current and historical information on these activities is maintained on file within the Center for use by authorized personnel.

Commercial fishing times and locations are available to fishermen on a 24-hour basis through recorded telephone messages; the number is 669-2828. Recreational fishing information is available to fishermen on a 24-hour basis by calling 666-3169. The recording is updated weekly (Wednesday) from May through September, with less frequent updates during the remainder of the year.



A Soviet stern trawler awaits the delivery of hake from Canadian trawlers off the lower west coast of Vancouver Island.

Contact: Vilma Miller,
Supervisor,
Operations Center.

Inspection

The Inspection Division of the Pacific Region maintains field offices and laboratories at the three major fishing ports of Vancouver, Victoria and Prince Rupert. The staff is well dispersed and constantly in touch with industry and fishermen. Processing plants, fishing vessels, transport vehicles and unloading sites are regularly inspected, along with fish and shellfish products entering into interprovincial, export and import trade under authority of the Fish Inspection Act and Regulations.

During 1982, the Inspection Division maintained surveillance of 136 fish plants, including 19 canneries. A program of plant and product inspection was maintained throughout the year to

ensure production and marketing of good quality products. Such inspections have become increasingly important because many importing nations will no longer allow products into their countries without accompanying certificates attesting to satisfactory quality and safety. As Canada is one of the largest exporters of fish and shellfish products, maintaining high quality standards is of increasing importance as markets have become very competitive.

In 1982, world attention was focused on the safety of canned salmon because of the unfortunate death in Belgium attributed to consumption of a can of salmon packed in Alaska. A very intensive surveillance program was initiated in B.C. for all salmon canneries and their products. Canneries were frequently surveyed and inspected, and a compulsory quality control program, which included processing and operational procedures and a thorough screening of finished product, was implemented at each facility. A significant proportion of field and lab time was redirected toward helping the companies preserve this multi-million dollar industry. As a result of splendid efforts by all Inspection staff and excellent cooperation by the canning companies, Canadian canned salmon still enjoys a favorable position on domestic and foreign markets.

The National Fish Quality Improvement Program, initiated in 1980, is well underway with the cooperation of industry. The main components of this program are:

- vessel certification: As this is already a condition of licencing, emphasis has been directed to monitoring and upgrading operational practices which have now been included in Schedule III of the Fish Inspection Regulations.
- final product grade standards: Standards have been developed with industry for frozen gutted Pacific salmon. These will be implemented in 1983 on a voluntary basis, becoming regulatory in 1984. Work is progressing on the development of groundfish fillet, food herring and oyster standards.
- improved quality control in processing plants: Guidelines are being developed with industry input. Workshops for industry are planned in 1983.
- unloading, dockside handling and transportation to plants: Regulations prohibit the use of equipment that damage fish. Approved water supplies are required at all unloading sites. The handling and transportation of fish is being monitored to ensure quality preservation.
- dockside grading: Dockside grading is being encouraged in recognition of those fishermen who take extra care to land top quality fish.

Fish Inspection activities are reported in detail in sections dealing with Fraser River, Northern B.C. and Yukon; South Coast and Northern Operations programs.

Contact: Charles Campbell,
A/Chief.

Inspection Engineering

The Inspection Engineering Section provides technical information and advice on fish plant construction and alterations to ensure compliance with the Fish Inspection Regulations. Technical information and training is provided to Inspection staff as well as to international organizations or companies.

The number of processing facilities remained constant at 135. The number of canneries reduced to 19 (22 in 1981). Included in the total are 4 sports/custom canneries.

Major changes were implemented in cannery quality control programs. Container integrity verification through double dud detector and check weighing equipment prior to labelling became a mandatory requirement for canned salmon.

To re-establish the confidence in Canadian canned salmon, several trips were made by Inspection staff to Great Britain. In addition, a joint team of Inspection staff and industry officials recertified the canned salmon production of two Canadian companies in New Zealand and Canada.

Contact: Sing Liem,
A/Senior Engineer.

Shellfish Coordinator

The shellfish coordinator's main responsibility is to administer the Sanitary and Paralytic Shellfish Poisoning (PSP) Control and Monitoring Program to ensure uniform compliance with national and international standards. This program serves to protect domestic and foreign consumers against the harvesting and marketing of unsafe shellfish products.

Gonyaulax (red tide) blooms along the British Columbia coast were detected quite early in 1982--from the first week of June to the end of October.

In addition to Areas 12 and 13, which were closed on May 1, Areas 15, 16, 17, 19 and 20 also experienced toxic conditions at different times during the summer and fall months.

There was one confirmed incidence of paralytic shellfish poisoning in the Pacific Region in 1982. On May 30, two women and a three-year-old boy were admitted to the Prince Rupert Regional Hospital for observation. The three experienced symptoms of paralysis after eating cooked mussels harvested from Work Channel--a permanently closed PSP area. No treatment was prescribed, and all three were released the next day. The leftover cooked mussels were found to contain 14,000 ug of toxin per 100 g of sample. Live shell stocks collected from the same location showed levels of 26,000 and 30,000 ug/100 g--the highest levels of PSP toxin ever recorded in bivalve molluscs along the B.C. coast.

Oysters and clam shell stocks in Area 17 and 18 encountered problems with faecal contamination again during the summer months. After consultation with the Environmental Protection Service (EPS), closures were instituted at five locations from August 13 to September 30. They were Degnen Bay (part), Boat Harbor, Walker Hook, North Cove, and Long Harbor. Piper's Lagoon was also closed on August 27, when a survey sample showed a faecal coliform level of 2,400 MPN/100 g.

Three locations in Area 16 were recommended for closure under Schedule 1 as the result of water quality surveys conducted by EPS. These areas include a small portion of Hidden Basin, the shoreward half of Churchill Bay, and a seasonal closure of Smuggler Cove.

In 1982, a computerized PSP monthly report system was implemented. The ability of the program to sort data by area, date, species, and PSP levels will provide management with easy access to an excellent data base.

The difficult economic time did not hamper the enthusiasm of a few individuals in the shellfish industry. As a result, the number of shellfish registrations actually increased to 59 at the end of 1982 from that of only 48 in the previous year. One processor successfully installed and operated depuration facilities for littleneck clams.

Contact: Rudy Chiang,
Sanitary Shellfish
Coordinator.

Boat Inspection

The Vessel Fish Hold Inspection Program was created to ensure that facilities for holding fish on board fishing and transport vessels are sanitary and conducive to the preservation of quality. More than 7,600 commercially licenced fishing vessels, packers, and barges are regularly inspected. The program is well accepted by the industry, and its success can be measured by the very low rate of failure to meet the standards--about two percent of approximately 2,400 inspections done in 1982.

As of October 1982, there are now requirements for vessel fish hold construction and operation, as well as requirements for the construction and operation of fish chilling and freezing systems. The aim of these regulations is to improve the landed quality of fish in Canada. The voluntary Freezer Vessel Quality Improvement Program, announced in 1982, is continuing. It involves a detailed survey of the freezing equipment and the landed quality of fish frozen on board and is intended to create an awareness of the importance of quality control in this type of operation.

In 1982, the first "P" licences, permitting processing at sea, were issued to two vessels to allow the processing of dogfish and squid. These vessels comply with the requirements of the Fish Inspection Regulations and are permitted to process only their own catch. They join the MV Callistratus as the only vessels in this region processing fish on board. As a condition of the licences, all landed products from these operations are sampled for analysis by one of the Fish Inspection Laboratories prior to distribution and marketing. Bacteriological and organoleptic analysis to date have indicated the products are of good quality.

Contact: Klaus Schallié,
Regional Vessel Inspection
Coordinator.

Product Inspection

The Product Inspection Division is responsible for the examination of imported and domestic fresh, frozen and canned fish products to ensure that organoleptic quality (appearance, odor, flavor, texture, etc.), container integrity, additives and labelling comply with Fish Inspection, Food and Drug and Consumer Packaging and Labelling Regulations.

Product rejections are generally related to poor quality or to improper labelling. Products which are decomposed or have in or upon them toxic substances or bacteria of public health significance are rejected as unacceptable for the consumer market. Canned products found to be under-processed or to exhibit loss of can integrity may not be marketed and are detained until disposed of in a manner satisfactory to the Department.

During 1982, the Division inspected a total of 9,436 lots of fresh, frozen and canned fish products. This was an increase of 20 percent over the previous year.

The Canned Fish Inspection Laboratory examined 33,854 samples from 1,371 shipments, representing 7,982,405 kilograms of imported products. The laboratory rejected 139 shipments totalling 935,358 kilograms from these imports. During the year, the laboratory also inspected 1,512 lots of domestic canned salmon, representing 815,464 equivalent 48-pound cases, valued at approximately $ 134.3 million. This is down from the previous season due, in part, to a month-long strike in the salmon fishing industry. In addition, the pack was further reduced as a result of the drop in the amount of fresh and frozen salmon imported from Alaska for the B.C. canning industry.

In 1982, it became mandatory for industry to mechanically screen all

1982 canned salmon to cull out defective tins. By the end of the year, 862 batches of the 1982 domestic salmon pack had been screened, and cull reports for each batch had been submitted to the laboratory for certification. This was a screening of 37.5 million cans or 43.5 percent of the 1982 production.

The Fresh and Frozen Fish Inspection Laboratory examined 5,445 samples from 4,010 shipments of imported fishery products which had a total weight of 8,915,552 kilograms. The laboratory rejected 209 shipments, totalling 217,705 kilograms.

Certification of canned salmon for the export market increased sharply, from approximately 25 percent of the production to 100 percent by mid-year, as a result of the crisis that arose earlier in the year. By year's end, approximately 45 percent of the pack had been certified for export. These Canned Salmon Inspection Certificates covered 365,283 equivalent 48-pound cases valued at close to $ 60 million.

There were 3,081 frozen fish export certificates issued for a total of 125 million kilograms of fish of all species, of which 112.5 million kilograms or 90 percent was for salmon.

Contact: Wilf Gushue,
Product Inspection Supervisor.

Bacteriological Laboratory

Import samples comprised 56 percent of the analyses performed in 1982. The annual number of import samples rose from 2,689 to 2,823 (a 5 percent increase). Domestic analyses concentrated on three major categories: fresh and frozen (9.8 percent); molluscs, including geoducks (9.7 percent); smoked/brined, including roe (9.2 percent).

There was a serious (85 percent) increase in rejected import lots, particularly of raw crustacea, from 61 to 113. Of 840 lots of crustacea, 71 were rejected for salmonella, and 29 additional lots for excessive Escherichia coli. The incidence of lot rejection for salmonella increased from 15 of 599 lots (2.5 percent) to 71 of 840 lots (8.5 percent). There were four times as many rejections for salmonella in 1982 than in 1981.

The laboratory, in collaboration with the Health Protection Branch, was heavily involved in sterility testing of canned salmon, both domestic and imported. This was a consequence of the concern elicited by the botulism death in Belgium that was caused by American canned salmon. A more complex procedure, increasing the workload per sample threefold, was used in analysing 3,117 cans.

Domestic product inspections resulted in 56 results that were bacteriologically unsatisfactory. These included 47 of 428 mollusc samples, 4 of 241 smoked/brined samples, and 1 fillet sample.

Contact: Nick Neufeld,
Senior Microbiologist.

Chemical Laboratory

The Chemistry Section is responsible for the chemical analyses of fish and fish products to determine compliance with the Fish Inspection Regulations.

During 1982, the laboratory inspected 1,836 samples, requiring a total of 5,689 different analyses. This compares favorably with the overall average workload experienced during the previous five years.

Unlike the previous year, the problem of histamine in canned tuna has settled down to a reasonable level of

2,331 analyses, compared with 4,902. This is attributed to a much-improved product from the Philippines; however, products from other offshore countries continue to require close scrutiny. Mercury in fish, particularly canned tuna, was for the most part found to be within present guidelines, and for this reason, the number of analyses has also decreased somewhat from that experienced in 1981.

A small number of mercury and heavy metal analyses were again performed for the Medical Services Branch of Health and Welfare Canada as part of its investigation of the Indian food fish safety program. Paralytic shellfish poison analyses were almost identical in number to the previous year--1,752, compared to 1,735.

The Chemical Methods Quality Assurance Program was continued again this year. Work was restricted mainly to the histamine program, with a smaller amount of time devoted to the mercury check samples.

Contact: Gin Farn,
Senior Chemist.

Fishing Vessel Insurance Plan

The Fishing Vessel Insurance Plan provides insurance coverage for insurable commercial fishing vessels under 23 metres (75 feet) in overall length. When vessels are appraised for insurance, the applicants are advised on ways to improve safety practices and equipment. They receive information on fire prevention equipment, fuel storage, lifesaving equipment, safety alarm systems, pumping systems, installation of cooking and heating units, heat dissipation, proper wiring and communication devices. General information is also provided to fishermen, prospective fishermen and credit institutions about the Fisheries Improvement Loan Act and Regulations.

Recent amendments to the Fishing Vessel Insurance Regulations broaden coverage to include protection against collision with a seaplane, make protection and indemnity coverage available to fishermen, define "vessel" to allow coverage while under construction (assistance from a subsidy), clarify the application of deductible in the partial loss of electronic equipment, permit the allocation of deductibles in proportion to fault in collision cases and remove the specific payment periods for additional and renewal premiums. Protection and indemnity insurance, which should be available to fishermen late in 1983, means insurance against risks not normally covered under a hull policy, such as loss of life and personal injury, excess collision liability, harbor damage risks, wreck removal risks, life and other salvage risks and claims of the crew.

A federally-sponsored insurance plan is available for commercial fishing vessels under 23 metres in overall length.

In 1982, 1,016 vessels were insured for a total insured value of $ 34,769,400. Revenue from premiums totalled $ 948,650. Refunds (for cancellations and overpayments) totalling $ 40,900 were made. Eighty-nine accidents were investigated, and 76 claims totalling $ 1,477,569 were paid. Twenty-two claims were for total losses ($ 995,719) and 54 claims were for partial losses ($ 481,850). The claims comprised 22 strandings, 8 collisions, 13 explosions and fires, 5 sinkings and 28 due to miscellaneous causes (storms, thefts, deadheads, etc.).

At the end of the calendar year, there were 39 unsettled claims estimated to total $ 235,850.

Contact: Vancouver - Audley Tinglin, Regional Manager

Steveston - David Dyck and Mac Chettle, District Managers

Nanaimo - Neil McAra and Dave Hayes, District Managers

Prince Rupert - Rob Newton District Manager.

Habitat Management

Habitat Management activities in the Region include enforcing several sections of the Fisheries Act, investigating projects which threaten fish stocks or supporting habitats, conducting applied research, developing and maintaining interagency liaison and project referral systems, and conducting internal and public information programs.

Technical investigations include assessing the impact of urban and industrial pollutant sources, diking, dredging and construction projects, forest harvesting activities, hydroelectric and consumptive water use proposals, estuarine and other foreshore use plans.

A Regional project referral network coordinates Departmental response to thousands of land use, water use and pollution projection projects from public, industrial or government agencies.

Contact: Forbes Boyd,
Chief,
Habitat Management Division.

Coordination and Liaison

The Planning Unit coordinates and plans Habitat Management activities within the Department and between various federal and provincial agencies. The Unit is contributing the Habitat component to the Regional Management Plan, developing cooperative resource management and systematic inventory programs, and participating in strategic planning with provincial agencies. In addition, the Unit is responsible for the coordination of expert witnesses and the job creation program.

Habitat Management Plan

The Planning Unit is developing the Habitat component of the Regional Management Plan, which is aimed at "conserving, rehabilitating, improving and restoring fish stocks and their habitats." The programs outlined to attain these objectives include a Regional overview of competing resources, cooperative resource management, habitat improvement projects, maintenance and formulating of ongoing

research, development of a comprehensive data base, improved habitat enforcement, and programs fostering intergovernmental cooperation and liaison.

Overview of Regional Economic Development

The purpose of the overview is to identify the degree to which various subregions of the Pacific Region will likely require increased habitat management support as a result of increased pressures from competing resource use.

The Regional overviews add to the inventory and data base required for comprehensive habitat and stock management plans. This is done by identifying development trends for various resource sectors which may impact on fish habitat, such as mining, energy and forestry. Specific development projects likely to proceed within five years were also identified for each management area.

Ministry of Environment

Under the Environment Management Act, the B.C. Ministry of Environment has a mandate to plan for the management of provincial environmental resources, including water, air, fisheries and wildlife. Under the direction of the Ministry of Environment, strategic plans, based on resource supply and demand, management options and objections, resource conflicts, and policy directives, are being developed for various areas of the province. The Planning Unit is coordinating the Department's response to this exercise.

Ministry of Lands, Parks and Housing

The Ministry of Lands, Parks and Housing initiated a joint agency program of foreshore-use designation in the District of Campbell River. The goal of this program is to zone the foreshore for compatible use designation and to assist the District in designing developments to complement the natural resources and their habitat sensitivity. HMD prepared an inventory of coastal resources.

Sport Fishing Piers/Artificial Reefs

Fishing programs designed to serve the needs of urban populations have not yet developed in B.C. The Washington State Department of Fisheries has sponsored a successful urban fishing program and has developed the criteria for the construction of artificial reefs and public fishing piers in Puget Sound. HMD is currently reviewing these urban fishing programs and exploring the feasibility of initiating similar projects in B.C.

Salmonid Habitat Evaluation Model (SHEM)

In spite of wide natural variability of systems to produce salmonids, computer modelling can be used to link stock management strategies with habitat capability. A pilot coho model was developed by Habitat Management in association with the Cooperative Fisheries Research Unit at the University of British Columbia.

The model is presently based on Regional biostandards and its precision will improve as more site-specific data become available.

Expert Witness Coordination

During 1982, numerous cases involving various sections of the Fisheries Act were before the courts and the Planning Unit coordinated expert witnesses for these cases. In addition, HMD initiated a formalized system of appointing expert witnesses and reviewing cases in an effort to maximize effectiveness.

Fisheries Employment Bridging Assistance Program

During 1982, Habitat Management implemented six projects under the UIC/Job Creation Program. These projects included a wide range of activities and employed more than 90 people. A summary report on these studies will be available in 1983.

a) Fraser River Habitat Mapping/ Rehabilitation Study

The Fraser River estuary was surveyed and mapped with an emphasis on areas where opportunities exist for debris removal and restoration of marsh habitat. A pilot project was undertaken in conjunction with the North Fraser River Harbor Commission to rehabilitate an area of marsh in MacDonald Slough.

b) Fisheries Watershed Resource Information Project

HMD compiled a computerized bibliography of published literature pertaining to fisheries-related research/ studies conducted in B.C.'s watersheds and estuaries. The information is geographically indexed, using a hierarchical watershed coding system developed by the Aquatic Studies Branch in Victoria.

c) Estuary/Foreshore Fisheries and Habitat Inventory

Field studies in Campbell River, Prince Rupert and Alice Arm included foreshore mapping of substrate composition and vegetation, benthic sampling and determining juvenile salmon distribution. A chinook spawner survey and egg take/plant on the Nechako River was also conducted. Benthic samples collected from the Campbell River area and the Nechako River were sorted and analyzed by project staff at the Pacific Environmental Institute. Support staff were provided to the Aquatic Studies Branch to assist in projects relevant to Habitat Management activities.

d) Fish Habitat Inventory and Cleanup

Stream inventories were conducted in the Tashish River watershed, Campbell River and Cariboo region to provide baseline data to evaluate and mitigate impacts of proposed logging, urban development and placer mining activities. A folio of maps, aerial photos and field data of the lower Fraser River islands, identifying areas of sensitive salmonid habitat, was compiled. Some 50-60 log-handling sites were surveyed to ensure that proper utilization of leasing sites is maintained. A similar folio was prepared for the Homathko River in response to a logging application to harvest deciduous cottonwood adjacent to productive fish habitat.

In conjuction with the International Pacific Salmon Fisheries Commission, the Unit examined the extent to which juvenile sockeye utilize the littoral zone. The results of the study will dictate which foreshore areas should be protected from development.

Gravel samples collected from Carnation Creek were measured for their organic content as part of the ongoing studies to assess the influence of logging on gravel quality.

Staff were provided to the Lands Directorate, to collect and map Regional resource information as part of a Coastal Zone Information and Analysis Report. These maps will enable Habitat staff to delineate areas or corridors of present/potential impacts on salmonids.

e) Regional Analysis of Fisheries Flow Requirements

A number of streams on the east coast of Vancouver Island, North and South Thompson Rivers, the Sechelt Peninsula and the Lower Mainland were surveyed as part of a Regional program of flow requirements. A report is being prepared for each stream, including hydrological, physical and fisheries information which enables tentative flow recommendations to be calculated for spawning and rearing habitat. The report will subsequently be used as a basis for watershed planning and water resource allocation. The program will be extended to cover other areas in B.C. and the Yukon.

f) Water Quality Surveys

Water quality surveys, ranging from short-term to comprehensive programs, were undertaken in response to numerous development activites which may potentially affect or alter water quality. Landfill sites in the Lower Mainland,

industrial woodwaste sites along the Fraser River, mining activities on Babine Lake and the Quinsam River, potential impact of acid rain on the fisheries resource, and pesticides from agricultural activity were all major elements of this program. In addition, a large inventory of maps and information packages related to water quality were completed in preparation for the decentralization of Habitat Management staff.

Contact: Tom Bird,
Chief,
Planning and Coordination Unit.

Land Use

The Unit provides technical advice to field staff and proponents regarding the prevention/mitigation of and compensation for adverse effects on fish habitat by land-based activity, such as logging, highway construction and flood control work.

Linear Development

Construction and operation of major linear development systems, such as highways, railways, pipelines, and powerlines, may conflict with rivers, lakes and streams--often with serious consequences to fish and fish habitat. Stream crossings, if poorly designed or constructed, are a major source of concern, due to the direct involvement with the stream channel and the capability of impeding or obstructing upstream fish migration. Encroachments and diversions of rivers and streams, through direct displacement or by alteration of normal channel hydraulics, also affect fish migration, as well as habitat used by fish for spawning and rearing. The Linear Development Group maintains close liaison with both public and private transportation agencies during the planning, design and construction of projects to ensure that impacts are minimized through development and application of environmental engineering guidelines, mitigative techniques and, in some situations, compensatory measures.

a) Highways

Major highway construction in 1982 was substantially reduced from previous years due to economic conditions. However, highway design continued at a normal pace. The Hope-to-Merritt (Coquihalla) Highway has been the subject of detailed environmental design; a major biophysical report and design manual was prepared by a team of consultants advised by the Linear Development Group. Work continued on the application of environmental design to the construction drawings and supporting documents. The successful implementation of environmental design may result in a net improvement of fish habitat in the Coldwater River.

The Group also continued its involvement in the Yellowhead Highway between Terrace and Prince Rupert, where major compensatory efforts will be required to recreate habitat lost due to the encroachment of road fills on to the Skeena River foreshore. The Ministry of Highways has retained consultants to address the problem and develop ways and means of replacing lost habitat.

Other B.C. highway projects receiving attention from the Group were the Annacis crossing on the lower Fraser River and the Qualicum North bypass route on Vancouver Island.

Resource roads--the hundreds of miles of logging, mining and exploration roads in B.C.--also received attention from the Group; a series of lectures/seminars were held in various parts of the province to inform industry and regulatory agencies about the conflict between roads and the fisheries resource.

In the Yukon, the North Canol Road reconstruction project entered an active phase. An Initial Environmental Evaluation report was issued and

reviewed, followed by the submission of preliminary design documents. The Group will continue a detailed review of road design and construction monitoring throughout the next few years. Design review is also taking place on the South Canol Road as well as the Klondike Highway.

b) Railways

The CNR twin-tracking project again demanded a large proportion of the Group's time in 1982. The project will result in the construction of approximately 482 km of new track adjacent to the existing track between Valemount and Vancouver, up to 80 km of which will require fills to be placed in the Albreda, North Thompson, Thompson and Fraser Rivers and their tributaries.

DFO arranged a river tour in April so that various agencies could see the implications of major fills in the Thompson River and their possible impacts upon pink salmon spawning grounds and the migration of important fish stocks such as pink salmon and the Adams River sockeye run. During the three-day trip, members of various government agencies and the CNR followed the Thompson River from Kamloops Lake to Lytton and viewed, recorded and discussed each of the many proposed river encroachments along the route.

A radio-tagging program was conducted to assess the difficulties facing fish on their upstream migration in the Fraser and Thompson Rivers and to evaluate the impacts of river encroachment. The joint DFO-IPSFC study (with assistance from the provincial Fish and Wildlife Branch and the CNR) was conducted in September and October to take advantage of the large Adams River sockeye run.

A total of 34 sockeye salmon were captured in the Fraser River near Yale and in the Thompson River near Lytton. The fish were tagged, fitted with a radio transmitter, and then released to continue their journey to the Adams River. The fish were tracked daily from an aircraft and also on the ground to record preferred migration pathways and any delays experienced by the fish. The study was successful and a large amount of data was recorded. A report on the findings of the study will be available early in 1983.

Construction is continuing on the Hydro-to-Thornton Yard and Kamloops-to-Tranquille sections, although work has been sporadic due to CN-funding difficulties. Although most of the important issues have been resolved, some detailed design is still to be reviewed by DFO.

The CN Northline from Valemount to Prince Rupert was the subject of two detailed field investigations by the DFO and other federal and provincial environmental agencies.

c) Pipelines

The final series of public hearings in the Environmental Assessment and Review Process (EARP) for the proposed Alaska Highway gas pipeline project was held in Whitehorse. The DFO position was presented during the week-long hearing. The Panel subsequently reported that the pipeline could be built with no unacceptable environmental impact, provided certain further studies are carried out and protective measures are incorporated into design and construction.

The Group continues to provide input into the planning and design of other potential pipeline projects. DFO continues to advise and coordinate comments from other federal agencies on the B.C. Hydro proposal for the Vancouver Island gas pipeline. This project will involve more than 100 stream crossings, including the Chemainus, Cowichan, Nanaimo, Qualicum and Puntledge Rivers.

Also under assessment is the Dome Petroleum Western liquified natural gas (LNG) project, which will extend from

the Alberta border to either Kitimat or Grassy Point near Prince Rupert. Major streams which might be affected by this project include the Stuart, Salmon, Telkwa, Bulkley, Zymoetz, Skeena, Lakelse, Gitnadoix, Kasiks and Chyex Rivers, as well as Fraser Lake.

Placer Mining

a) Yukon

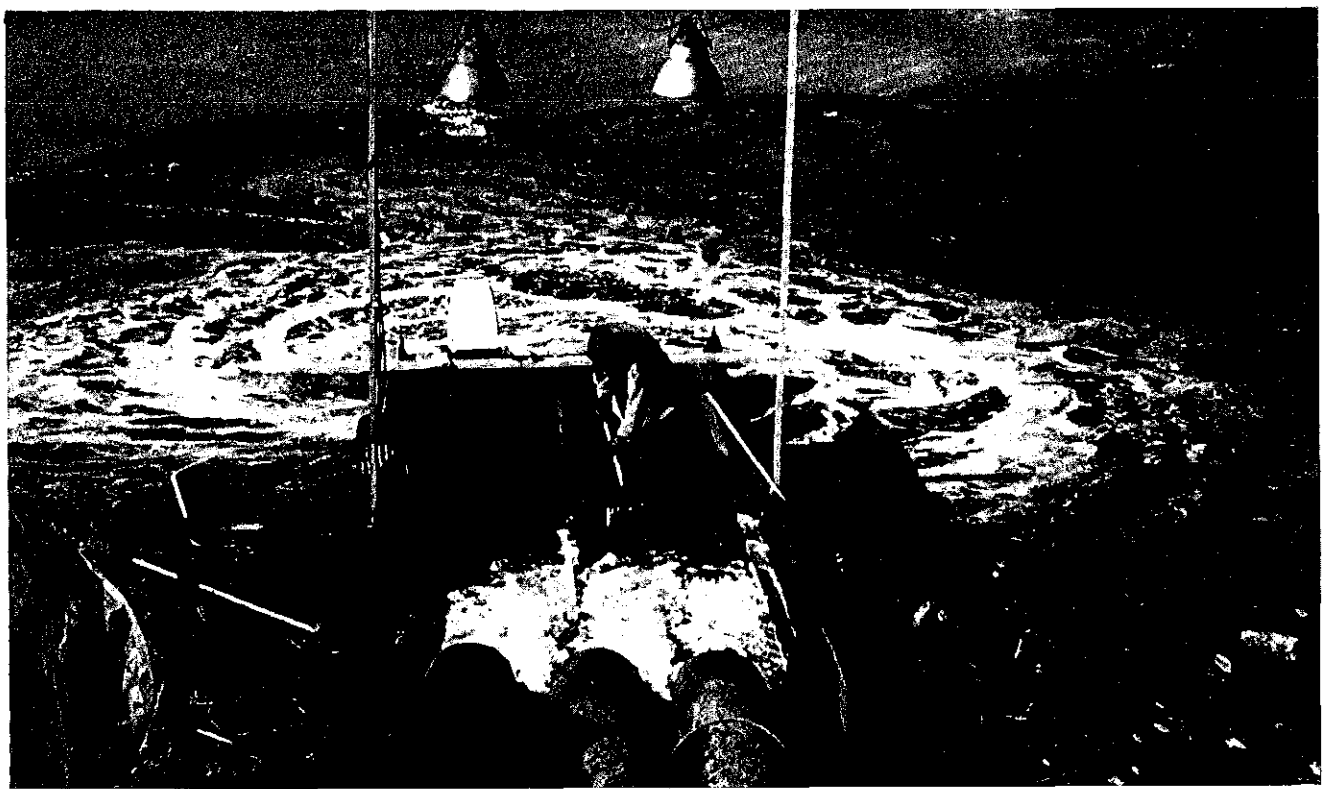
In 1982, the management plan for placer mining which had been developed in the previous year by DFO and the Department of Environment was refined and formed the basis for the development of placer guidelines. These guidelines were jointly prepared by DFO, the Department of Environment and the Department of Indian Affairs and Northern Development and will be presented to the public and industry for public review.

One element of the guideline package is a set of maps showing stream-reach classifications. All streams in the Yukon affected or likely to be affected by placer mining have been classified according to present knowledge of fisheries utilization or habitat values. Where data gaps occur, a subjective assessment based on available information has been made. The guidelines allow for challenge of the classification; however, the placer operator is responsible for acquiring the necessary biological information to permit re-evaluation.

The public review process is expected to occur in the summer of 1983, with implementation of a revised guidelines package in the 1984 season. When implemented, the placer guidelines will enable placer mining to proceed in a manner compatible with environmental protection.

b) British Columbia

During the 1982 placer mining season, there were 700 placer operations in B.C. This was a slight



New technology is being developed for placer mining activities on the Fraser River near Yale. This combination--sluice box, hydro cyclone and sand screw--produces no direct discharge. Fines such as silt and clay are discharged as a thick slurry and buried in coarse tailings.

decrease from 1981, when there were 721 operations. Of these 700 operations, 360 were in areas frequented by anadromous species of fish and were therefore of concern to DFO. Some 60 percent of the 360 placer mining operations were mechanized; the remainder were hand operations (i.e. gold panning).

DFO also met with provincial counterparts in MOE to critically review the present referral system, regulations and guidelines. Recommendations to protect aquatic resources from this type of mining activity are presently under consideration by the provincial cabinet.

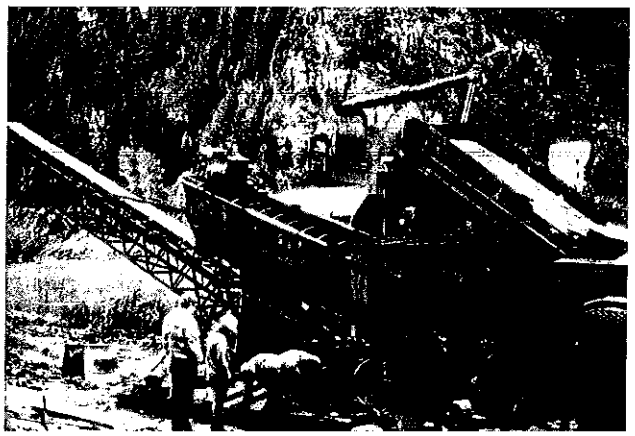
In 1982, the Land Use Unit produced an interim report entitled "Placer Mining Regulations and Guidelines for the Protection of Fisheries Resources in British Columbia." This document was distributed in limited numbers to District staff. Further distribution will be withheld, pending the present review of the placer referral system.

Dredging

During the 1982 downstream fry migration period in the Fraser River, only Public Works Canada and two commercial dredging operators (Centennial Dredging and Sand Ltd. and Sceptre Dredging Ltd.) were actively dredging on the Fraser River.

All four dredge operations were monitored in 1982. Based on the results of the monitoring program, the total entrainment of salmon fry by the dredge operations during the downstream migration was 58,329 pink salmon fry and 5,298 chum salmon fry. This entrainment represents 0.01 percent of pink salmon and 0.0015 percent of chum salmon migrating out of Fraser River.

The economic impact of dredging to the fishery resource has been assessed, as well as the economic impact of monitoring on the dredging industry. Recommendations have been made to revise the Fraser River Dredging guidelines accordingly.



The Department of Public Works' 322 pipeline suction dredge in Bedford Channel is monitored for the presence of downstream migrants.

Flood Control/Drainage

The Flood Control Group maintains close liaison with District staff, government agencies, consultants, and contractors to reduce or alleviate impacts to the salmon resource from activities related to flood control, agricultural and domestic drainage, gravel removal, stream crossings, and stream restoration. Contact is generally provided through the referral system, and the Group's involvement is providing technical investigations, assessments and advice on proposed or ongoing projects.

a) Flood Control

Projects varied significantly in size and involvement. The Group reviewed ongoing major proposals for the Fraser River Flood Control Program, Pemberton Valley Diking Program, and the Squamish Diking Program, as well as many other smaller proposals throughout the province. The Squamish Diking Program required a large time commitment during 1982 to review and evaluate multimillion-dollar design proposals and to monitor various stages of dike construction and installation of regulating structures. Other major involvements included: continuing application and monitoring of side-mounted flap gates, assisting in negotiating an agreement for the "Memorandum of Understanding concerning

Emergency Measures" between DFO and the Ministry of Environment and confirming stream repairs and expenditures from the 1980-81 major floods for the flood restoration audit for Emergency Planning Canada.

b) Drainage Assessments

These assessments included agricultural and domestic proposals primarily in the Fraser Valley and on Vancouver Island. The Group evaluated the effects of proposals in such locations as Squamish, Pemberton, Duncan, Comox, Matsqui, and Coquitlam. Recommendations and conditions to minimize impacts to the fisheries resource were forwarded to proponents (developers).

c) Gravel Removal

Major assessments were carried out at Squamish, Chilliwack, the Kingcome River and on many smaller systems. A variety of methods, such as engineering surveys, scuba, sonar gravel sampling, hydraulic sampling, and electroshocking, were utilized. The Group also provided advice on design of catchment basins to stabilize spawning beds and on resolving removal concerns in a system with a low gravel replenishment rate.

d) Stream Crossing

Proposals included reviewing plans for construction and demolition of trestles and bridges throughout the province. The most common referral agencies are: Ministry of Transportation and Highways, Canadian National Railways, and the B.C. Ministry of Forests. The Group reviewed design drawings, conducted site inspections, and ensured that provisions for habitat protection were incorporated into the contract documents. In-water blasting, although discouraged by DFO, was permitted when it was demonstrated to be the only reasonable means of dismantling concrete piers and abutments. However, stringent conditions were imposed and a monitoring program was implemented to document fish mortality.

e) Stream Restoration

Projects in 1982 included the Upper Paradise Valley side channel, on the Cheakamus River system near Squamish and Byrne Creek, a tributary to the Fraser River in Burnaby.

The Cheakamus project, partially funded by DFO's Salmonid Enhancement Program will provide substantial benefits for the chum and pink salmon.

The side-mounted flap gates installed on Byrne Creek have now been applied successfully in other locations, opening up formerly productive streams to fish utilization again. An assessment is planned to determine possibilities for re-establishing formerly productive spawning streams throughout the Pacific Region. The possible benefits to the fisheries resource could be substantial.

Forest Harvesting

a) Carnation Creek Watershed Project

This long-term project was initiated to obtain information on the responses of watersheds and fish populations to logging in B.C.'s coastal areas. Studies began in 1970 and were designed to compare physical and biological watershed processes during pre-logging (1970-75), logging (1975-1981) and post-logging (1981-85) phases. In February 1982, a three-day workshop was held to review the results of the preceeding 10 years of research. The sessions were well attended by an international, multi-disciplinary array of scientists and resource managers. Proceedings of this session will be published in February 1983. Findings to date include:

- spawning gravel quality, salmon egg-to-fry survival and benthic food organism densities have declined as a result of the accumulation of fines in the top layer of the streambed. These fines appear to originate from eroding stream banks (located 1.4 to 2.2 km upstream) which have been destabilized by streamside logging activities

Each year, HMD examines the stream morphology on Carnation Creek to measure post-logging effects of various forest harvesting methods.

- the introduction of logging debris and the destabilization of large instream organic debris by streamside logging activities have resulted in extensive morphological changes in the stream channel and streambed. Freshets have channelized many segments of the creek by eroding stream banks, filling in pools and straightening the channel, thereby reducing fish rearing habitat

- post-harvesting slope stability problems are becoming apparent. Two slopes failed in the winter of 1981-1982. These slides were surveyed and adjacent groundwater profiles are being monitored.

b) B.C. Ministry of Forests "p" Clause Review

In recognition of the need to consider fisheries values during forest harvesting operations, a series of stream protection clauses ("p" clauses) was introduced in the Prince Rupert Forest District in 1956. The clauses remained basically unchanged until January 1979, when the MOF revised much of the text so that more realistically operational situations could be addressed. Changes included the addition of a general pollution prohibition clause and provision for allowing MOF forest officers to authorize, without consulting other resource agencies, the deposition of a "polluting substance" into water. Successful implementation of these clauses on an operational basis relies on good judgment and understanding of site specific processes by members of the industry, MOF, F&W and DFO. Present experience indicates that industry field staff (particularly fallers, rigging crews, etc.) are often unfamiliar with the content and intent of the "p" clauses.

In 1982, DFO, MOE and MOF agreed to review the current stream and water quality protection guidelines.

A report has been written which reflects the position of both headquarters and field staff of DFO and MOE. Similar documents were prepared by industry/MOF and the Fisheries Research Branch. A workshop will be held in April 1983 to review and consolidate these positions.

c) Queen Charlotte Islands Research Program on Fish/Forestry Interactions

The Fish/Forestry Interaction Program was initiated by DFO and the provincial Ministries of Forests and Environment as a positive step toward resolving the major conflicts concerning steep-slope logging, (i.e. areas with landslide potential) and facilitating integrated management of fish and forest resources on the Queen Charlotte Islands. The objectives of the program are to:

- document the extent and severity of the impacts of debris torrents and

landslides on fish habitat and forest sites

- investigate the potential of alternative logging planning and methods, including he use of skylines and helicopters, to reduce the incidence and severity of logging-induced slope failures
- assess alternative silvicultural treatments for maintaining and improving slope stability
- investigate the feasibility of rehabilitating stream and forest sites damaged by debris torrents and landslides.

The program began in 1981 with the selection and organization of the research team; preliminary and data base research was carried out and a research plan was finalized. The full-scale field program commenced in the 1982 field season, and research projects will continue, in phases, over the next four years.

d) Tsitika River Integrated Resource Plan

The Tsitika River drains a 34,400-hectare watershed north of Campbell River on the east coast of Vancouver Island. The anadromous fish species utilizing the system include all five of the Pacific salmon, as well as Dolly Varden char and steelhead trout.

A logging moratorium was placed on the watershed in 1973. At the request of the B.C. Ministry of Forests, DFO participated on a planning committee that prepared an integrated resource management plan for the watershed. This planning process included the development of a fisheries resource inventory, including the identification of sensitive fish habitat, and the establishment of innovative prescriptions which are intended to ensure the preservation of the fisheries resources of the Tsitika River watershed.

Shortly after forest harvesting operations began in the basin, it became apparent that the forest industry was having difficulty interpreting the intent of the resource plan fisheries prescriptions as they related to smaller non-anadromous fish streams. In response to these operational problems, the Forest Harvesting Group and the B.C. Ministry of Environment developed in 1982 a set of guidelines to assist industry and agency staff in making logging decisions that are intended to protect these channels. Of particular concern is the minimization of sedimentation, the management of debris and the maintenance of channel stability.

e) Campbell River Estuary Rehabilitation

Since the turn of the century, the Campbell River estuary has been utilized extensively for log handling and storage activities. As a result, natural estuarine habitat has been drastically reduced.

In 1982, the Group worked closely with B.C. Forest Products Ltd. (BCFP) and other agencies to develop a facility which would have minimal environmental impact and to rehabilitate the estuary by returning the old booming ground to productive estuarine habitat.

A key element of the rehabilitation program was the construction of five islets within the old booming ground.

Four of the islets are intertidal; the fifth rises approximately six meters above a zero tide. The total area of the islets, including the side slope, is 3.2 hectares. Approximately 23,000 cores of Carex and Juncus marsh grasses were extracted from nearby donor sites and replanted in several experimental plots on the islets. Preliminary results indicate that the islets are stable and more than 93 percent of the transplanted cores are growing successfully.

A major cleanup of logs and debris accumulations in the estuary accompanied the development of the islets.

Large quantitites of bark and other log handling debris, as well as many of the 1,600 pilings, were removed from the old booming ground. Initial cleanup was by clamshell dredge. After the marsh-grass cores were established, the final cleanup involved work by helicopter, skidder and hand labor.

A multi-agency, interdisciplinary team will undertake detailed studies during the next four to five years to evaluate the success of this project.

f) Biophysical Surveys

i) Chemainus River Estuary Log Storage Leases

Log storage leases in the Chemainus River estuary expired in February 1982. Much of the 95-hectare lease area was intertidal and particularly sensitive to the environmental damage associated with shallow-water log storage. The Unit negotiated a realignment of the leases: much of the shallower area was deleted and the remainder consolidated in deeper water. The new leases represent a 45 percent reduction (from 95 ha to 43 ha) in log storage lease area within the estuary.

ii) Tahsish-Kwois Integrated Resource Management Plan

The Tahsish-Kwois watershed is on the northwest coast of Vancouver Island. The drainage, covering approximately 19,000 ha, is characterized by a broad, braided lowland flood plain and steep canyons running through sharply-rising mountains. The watershed of the upper Tahsish River has been partially logged, but the remainder of the drainage, the Kwois, Silburn and lower Tahsish watersheds, is still undeveloped.

Harvesting of the lower drainage was scheduled to begin in 1982, but public concern postponed operations.

Freeze core gravel samplers are used to determine substrate composition.

Much of the lower flood plain consists of side channels which act as important rearing habitat for juvenile salmonids. Similarily, the lower reaches of tributaries to the Kwois are important for resident and rearing fish.

Fisheries prescriptions for forest harvesting activities are currently being developed as part of the integrated resource management plan.

g) Forest Harvesting Referrals

In 1982, a number of forest harvesting referrals were assessed. These assessments generally involved a technical review of the proposed activity or operation (forest road and bridge construction, logging plans, rate-of-cut, fisheries prescriptions, etc.) to determine and minimize the potential impact on fish and fish habitat. Specific locations included: Slim Creek (Prince George), Eve River (Kelsey Bay), Toquart, Cottonwood River (Quesnel), Mary Basin/Guise Creek, Kennedy Lake, Anstey River, Nahwitti River, Trembleur Lake, Tachie River and Morrison River (Babine Lake).

Other projects included:

i) Stein River Resource Folio Plan

Concern centers on the maintenance of upstream migration for chinook and coho salmon.

ii) Deciduous Tree Farm Licences

Deciduous TFLs were applied for in the Kingcome and Homathko River areas and the lower Fraser Valley. These proposed TFLs are significant in that deciduous growth tends to be most concentrated on the flood plains and islands of rivers. Harvesting activities in these areas may have adverse impacts on adjacent fish habitat. Fisheries and habitat concerns were identified. Depending on potential resource conflicts, DFO may ask that significant sections within the proposed TFL boundaries be deferred from cutting.

iii) Log Handling Referrals

The Group assessed a number of log handling referrals, dealing with such subjects as dryland sort construction and maintenance, log yard maintenance and debris management, lake shore cleanup and log salvage and log booming time constraints. Specific locations included: Hanson Island (Alert Bay), Constitution Creek (Courtenay), Naver Creek (Hixon), Quesnel, Owikeno Lake and Nass River.

Major projects included:

i) Tahsis River Estuary Sawmill Expansion

Since the 1940s, Tahsis Company has alienated 72 percent of the Tahsis River estuary. The company plans to fill and permanently alienate 56 percent (4.9 ha) of the remaining estuarine fish habitat.

The company has proposed to enhance the remaining estuary, approximately three hectares, with marsh and eelgrass transplants. However, DFO biologists rejected the compensation proposal as inadequate to maintain the existing level of estuarine productivity and fish utilization.

Negotiations continued during 1982, but have not led to a satisfactory solution.

ii) Salmon River Estuary/Kelsey Bay Dryland Sort

MacMillan Bloedel Ltd. has operated a major office, maintenance and log watering facility on the Salmon River estuary at Kelsey Bay for a number of years. Starting in 1978, the company proposed to fill and permanently alienate six hectares (subsequently reduced to 2.8 ha) of intertidal estuarine fish habitat in order to develop a dryland sort. The company proposed to compensate for habitat loss by way of eelgrass transplants and excavation of refugia (refuge areas for fish during low tides) on existing mudflats and placement of rocks for colonization by

the seaweed Fucus. DFO biologists determined that the compensation proposal would not maintain the existing level of fish utilization and estuarine productivity because the proposed measures would merely create one form of habitat (eelgrass, refugia, Fucas) in place of another (mudflat) and would not replace the alienated area. Accordingly, DFO asked for the excavation of land to create an area of intertidal habitat equal to that alienated.

In 1982, the company reopened negotiations with respect to the 2.8-hectare fill. A habitat compensation option, which may be feasible if the company can reduce their fill requirement to 1.6 hectares, has been identified.

iii) Seymour Inlet Dryland Sort

In the spring of 1982, Whonnock Industries Ltd. developed a small dryland sort at the head of Seymour Inlet. Approximately 0.4 hectares of intertidal mudflat was alienated. Under the direction of the Group and District staff, the company has embarked on several compensation projects:

- two tidal channels have been excavated, creating a significant amount of intertidal fringe extending into the tree zone. The channels will be monitored for fish utilization and stability, and more channels may be excavated in the future
- the rehabilitation of a 0.5 ha tidal slough is underway with the removal of an old log culvert which had blocked the mouth of the slough. Depending on the rate and extent of natural rehabilitation, the slough may be enhanced further at a later date
- the company has agreed to assist with road construction and logistical support if SEP proceeds with an enhancement opportunity which has been identified in the area.

iv) Quesnel Lake Junction Block Harvesting Feasibility Study

The B.C. Ministry of Forests proposes to log the Junction Block area of Quesnel Lake and has produced a study outlining its feasibility. Two major items of concern are: the proposal to transport logs by water (i.e. by bundle booms on Quesnel Lake itself), and the lack of biophysical data site-specific to those areas proposed for development. MOF, having been advised that an environmental impact analysis should be carried out of the alternative log transport systems, has offered to assist in setting up an appropriate program. However, by year-end, nothing had been initiated.

v) Shoal Islets, Crofton Sawmill Development

B.C. Forest Products is proposing to develop a sawmill site adjacent to their dryland sort on the Shoal Islets. Development of the site would include filling of 10 hectares of intertidal mudflat and the suction dredging of an adjacent 18 hectares of intertidal mudflat. In total, approximately 28 hectares of habitat would be alienated to some degree.

As compensation, the company proposes to:

- return to the Crown 10.4 hectares of BCFP-owned intertidal land in the nearby Bonsall Creek - Chemainus River estuary
- give to the Crown and rehabilitate to an intertidal condition six hectares of BCFP-owned land in the Bonsall Creek-Chemainus estuary; this area is cut off from tidal flooding by a dike.

The Forest Harvesting Group considers the area behind the dike to have good potential for rehabilitation as estuarine, side channel habitat. If the rehabilitation scheme proceeds, DFO will work closely with BCFP and other resource agencies to design a project which will maximize habitat but provide opportunities to conduct research into the processes of estuarine habitat.

vi) Morrison Arm, Babine Lake Log Watering and Storage

In the summer of 1982, the B.C. Ministry of Forests identified a

serious mountain pine beetle problem in the Morrison River/Lake area north of Babine Lake. As part of the control harvesting operation, MOF proposed the water transport of logs on Babine Lake: watering in Morrison Arm, storing and towing in bundle booms, and dewatering south of Tachek Creek.

A dive survey conducted in 1982 indicated:

- the areas proposed for development were free of salmonid spawning activity and suitable spawning substrate
- there were significant deposits of bark and wood debris associated with those areas currently used for log handling and storage.

Because a major concern is the potential impact of log watering and storage on juvenile salmonids, MOF has been requested to carry out a study of utilization of the area by rearing sockeye.

Urban Development

A reduction in staff in 1982 resulted in very little activity in this area by the Unit; the majority of referrals and planning initiatives have been handled by District staff.

However, HMD staff continued to provide input into a few major urban proposals:

a) Brunette River

The Greater Vancouver Sewerage and Drainage District undertook a major flood prevention program in the Brunette River. This work included stream widening, debris removal, dredging the channel and the construction of a flood overflow channel. The project will provide relief from the annual flooding problems which have plagued the industrialized lower reaches of the Brunette.

b) Fraser Industrial Park

This large industrial development (259 ha) is located in the headwaters of West Creek in Langley. DFO input will ensure that resource maintenance flows and suitable water quality are preserved in this system.

Contact: John Payne,
Chief,
Land Use Unit.

Water Quality

The Water Quality Unit is responsible for ensuring that acceptable water quality conditions are maintained in the freshwater, estuarine and marine environments. The mandate of the Unit is based on the Fisheries Act [Section 33(2)] which prohibits the deposition of deleterious substances into waters frequented by fish. Other sections, such as 33.1, provide authority to deal with specific pollution problems and to protect fish habitat. To meet its mandate, the Unit carries out technical impact assessments of proposed and ongoing effluent and solid waste disposal operations and pesticide and environmental contaminant use. Short-term applied research projects and monitoring studies are carried out to assess the impacts of effluent discharges (e.g., sewage, pulp mill effluent) in freshwater, estuarine and marine environments.

The Unit also coordinates the interagency referral system regarding waste management, pesticide and ocean dumping, serves on numerous task forces and committees dealing with major industrial developments and other water quality issues, participates in technical inquiries and responds to and investigates environmental emergencies.

This year, decentralization of the referral systems commenced and technical workshops were held to introduce staff to the pesticide and waste management referral systems. Decentralization of the systems will be complete in 1983.

Contact: Mike Nassichuk,
Chief,
Water Quality Unit.

Freshwater Section

The Freshwater Section of the Unit was involved in one major study during 1982, as well as a number of short-term technical assessments.

Major involvement on national committees (e.g. National Chemical Hazards Review, National Acid Rain Program, Mining Effluent and Pulp and Paper Effluent Regulations Reviews) has required considerable time and effort by Freshwater Section staff. It is expected that such committee involvement will increase in 1983.

a) Acid Rain Monitoring Study

An acid rain monitoring study was started by the Unit in conjunction with the International Pacific Salmon Fisheries Commission, in response to B.C. Hydro's Hat Creek proposal. The scope of the program was expanded in 1982 with broader geographic reference to document the sensitivity of selected "lower order" (i.e. headwaters) salmon streams to acidification. With national funding, the program has produced considerable baseline surface water and snowpack chemistry data of Regional interest; the data are also pertinent in the context of the DFO National Acid Rain Program.

The work has indicated that a number of smaller, salmon-bearing North Coast streams are already "acidic" from natural sources (e.g., bog drainage) and may not withstand further acidification from other sources, such as acid rain. Assessment of salmon stocks indigenous to these drainages, with respect to the potential for unique racial adaptation, is worthy of further consideration under National Program funding.

Early in 1983, additional snowpack and surface water monitoring will be carried out on selected coastal and Interior salmon streams to further develop the existing data base on sensitivity.

b) Hatchery Wastewater Study

The hatchery wastewater study, funded by the Salmonid Enhancement Program and designed and directed by the Water Quality Unit, is nearing completion. It is expected to provide substantial guidance to SEP in facility planning and design, specifically regarding nutrient-associated impacts of discharges.

c) Cowichan River

A report on a Cowichan River study, carried out in conjunction with the Environmental Protection Service (EPS), will also be completed soon. This report will identify receiving water impacts of a sewage discharge into the Cowichan River and will provide recommendations regarding resolution of the seasonal nuisance algal problem in the receiving waters.

In 1982, the assessment of mining proposals and their potential effects on fish and fish habitat was a high priority for the Unit. The metal and coal mining sectors continued to demand a high level of Unit involvement in 1982, when the industry implemented expansion and new development proposals.

d) Quinsam Coal

A large open-pit mine is proposed for the Quinsam River watershed. The Unit recently completed a critical review of the company's addendum to its 1981 Environmental Impact Statement. A DFO position on the project is being developed, with technical assistance from the Environmental Protection Service (DOE).

e) Amax Molybdenum

The Amax mine at Alice Arm, which began operations in 1981, continues to occupy a high profile and has resulted in frequent Unit involvement in scientific reviews, technical briefings and exchanges of information with the public.

f) Westmin Resources

An existing mine on Vancouver Island, Westmin Resources Ltd. (formerly Western Mines), discharges mine tailings into Buttle Lake which drains into the Campbell River system. An effluent abatement program was evaluated in conjunction with with the company's current expansion proposal. An Environmental Impact Statement relating to the planned expansion was reviewed by the Water Quality Unit.

g) Consolidated Cinola

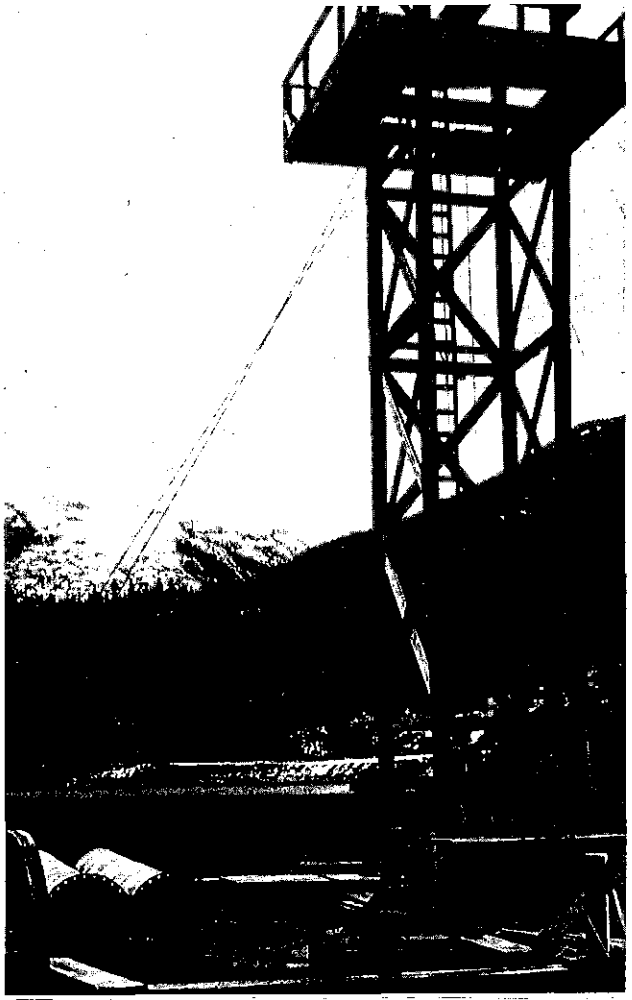
The proposed Consolidated Cinola gold mine on the Queen Charlotte Islands has received considerable attention by the Water Quality Unit through participation on a federal Regional Steering and Coordinating Committee. The existence of the important Yakoun River salmon resource and the potential impacts of the operation (e.g. habitat loss, mercury contamination, process chemical lossess) demands an in-depth review by the Unit. Further involvement is anticipated in 1983.

h) Carolin Mines

This operation released toxic mine tailings into a stream tributary to the Coquihalla River hear Hope. Provincial and federal charges (Fisheries Act) were laid aginst the gold mine. The Unit is now reviewing the question of the production of an acceptable effluent over the long term.

i) Noranda-Bell

In 1982, a holding pond dyke at the Bell Copper Mine breached, resulting in a substantial loss of tailings water to Babine Lake. In an effort to prevent further spills, Noranda-Bell submitted a request to discharge pit waters and excess tailings pond waters to the lake. Unit staff reviewed this proposal and the question of the maintenance of lagoon freeboard during operating and non-operating phases. As a result of the review, a temporary discharge of tailings pond waters was allowed under strict conditions. The Unit also specified the need for an environmental impact assessment should long-term discharges be required.



Mining operations on Buttle Lake have been the subject of intense habitat investigation.

j) Cyprus Anvil, Yukon

Since 1969, Cyprus Anvil mining corporation has operated a 9,000-tonne-per-day lead/zinc mine and mill complex near Faro, Yukon Territory. In 1981, the company submitted a report in support of a renewed water licence. It included a proposal for final abandonment of the large tailings impoundment. The Unit reviewed the report, and in conjunction with the Environmental Protection Service, prepared and presented a brief at the public hearing in Faro in March 1982. The licence was granted, but specified strict operating

conditions and the need to carry out additional studies was identified by DOE/DFO and others at the hearing.

k) Referrals

Two major referral systems are coordinated by the Freshwater Section, for waste management and pesticides. In 1982, the Section reviewed approximately 250 Waste Management applications for the discharge of effluents or the disposal of solid waste. Applications are received via EPS and, following evaluation of potential impacts and resources at risk, the Departmental position is formulated and presented directly, or via EPS, to the proponent.

The Unit assessed approximately 300 pesticide (insecticides and herbicides) referrals in 1982. A training program is underway to facilitate the decentralization of referrals to District offices.

Unit staff represent the Department on the B.C. Aquatic Weed Advisory Committee. The committee is responsible for providing a forum to evaluate impacts and review research/control measures relating to aquatic weeds.

The Unit scrutinized the use of relatively toxic herbicides for intensive aerial forestry management programs, and monitored the removal of sediments contaminated with creosote (wood preservative) in the lower Fraser River.

Unit staff responded to fish kills, chemical and oil spills, answered public inquiries and represented the Department on the Fraser River Monitoring Committee in the development of an extensive water and sediment chemistry sampling program for implementation by the Province over the next several years.

Marine Section

a) Referral Systems

In 1982, the Marine Section continued its participation with other agencies in established, formal referral systems. In association with the Environmental Protection Service and Fisheries Research Branch (DFO), the Section assessed issues relating to existing or potential discharges from pulp mills and their impact on the marine receiving environment. Reviews which were undertaken included: MacMillan Bloedel's Port Alberni mill (effluent treatment biobasin operation); Western Forest Products' Port Alice and Woodfibre mills permit compliance assessment (effluent treatment upgrading); Canadian Forest Products' Port Mellon mill (effluent diffuser installation). In addition, the Section reviewed biological monitoring programs currently underway and rquired by the Waste Mangement Branch for many coastal mills.

The Marine Section also expended considerable effort in coordinating Departmental involvement in the referral system associated with the Ocean Dumping Control Act (ODCA), which is administered by EPS. Permit applications reviewed included routine, short-term dredging proposals for various industrial operations to large-scale, contentious issues such as the B.C. Place/Expo 86 Development Project for False Creek. Major environmental concerns associated with these assessments involved the potential impacts on receiving water quality and on the fisheries resource from dredging and disposal of sediments contaminated with heavy metals and organic compounds.

Coincident with HMD's decentralization of the referral systems, an interim decentralized program for the ODCA was successfully implemented with the cooperation of EPS and DFO District staff. A permanent decentralized system will be established by the Marine Section in 1983.

The Section continued to review Waste Management Branch (WMB) sewage discharge permit applications. WMB application reviews also involved oil and gas transportation, storage and

refinery operations; proposed petrochemical developments; and coal ports.

b) Task Forces

The Marine Section continued to participate on a Regional Steering and Coordinating Committee Task Force established to address petrochemical developments within the Pacific Region. Considerable effort was expended on several proposals, including facility siting on S. Kaien Island (Prince Rupert), Fraser-Surrey Docks (Fraser River), and Pacific Coast Terminals (Burrard Inlet). The Section also is a member of the Offshore Oil/Gas Development Task Force and is also involved with the LNG (Liquefied Natural Gas) Task Force.

c) Marine Studies

In 1982, the study of heavy metal uptake and depuration by the common mussel at the Iona sewage plant was completed. (The study was begun in 1981.) Data are presently being reviewed and the report will be prepared in 1983. The Marine Section also assisted the Fisheries Research Branch (Salmon Habitat Research) in water quality and impact assessments of Iona sewage discharges on salmon.

d) Emergency Spill Response

The Section continued its involvement in emergency contaminant spills. In cooperation with the emergency programs and organizations within DOE (EPS) and the provincial government (Provincial Emergency Program), and Marine Section maintained contact with DFO and other agencies to ensure a coordinated DFO response to spill incidents and participated in technical assessments of contaminant spills. These assessments may involve receiving environment impacts, prosecutions, containment/clean-up options, and promoting mitigative/preventative measures (e.g. fuel storage).

e) Expert Witness

Marine Section staff participated in an EPS-sponsored Expert Witness Course; established a comprehensive saltwater bioassay program at DFO's West Vancouver Laboratory to assess the toxicity of various oils and petrochemicals on fish; and developed appropriate expertise for legal testimony. The demand for expert witnesses in Fisheries Act prosecutions has increased steadily and will require further development of such expertise.

Hundreds of minor spills, such as this one near Campbell River, occur along the B.C. coast every year.

f) West Coast Offshore Development

The interest in developing potential offshore oil and gas reserves on the West Coast by industry and federal/provincial energy agencies prompted the establishment of the West Coast Offshore Developments Committee (WESCOD) within DFO. This committee is chaired by the Marine Section and complements other DFO committees for the north (ARCOD) and east (ECOD). It consists mainly of representatives from Ocean Science and Surveys, Fisheries Research Branch, and Fish Habitat Management Branch (Ottawa).

In mid-1983, the formal release of Initial Environmental Evaluation documents of proposed exploration and development of potential offshore oil/gas reserves by Chevron and Petro-Canada is expected. The committee will undertake a comprehensive review of

impacts on the fisheries resource and on the associated fisheries. The committee has been involved in an informal review of Petro-Canada's draft documentation.

g) Job Creation Projects

The Marine Section supervised several programs which were undertaken through the assistance of the UIC Job Creation Project. These incluced: fisheries utilization and water quality assessments adjacent to several marine pulp mills, saltwater bioassays and a comprehensive West Coast environmental resource sensitivity assessment and mapping program. The assessment/mapping program, undertaken jointly by DOE (EPS) and the Marine Section at the request of the federal Department of Energy, Mines and Resources, will be invaluable, not only in specifically assessing offshore oil/gas related proposals, but in reviewing other projects and responding to agency requests that require a fisheries resource data base. Additional work may be required in 1983 to refine the existing environmental information, in conjunction with expected WESCOD involvement in offshore proposal reviews.

Laboratory Services

Laboratory Services, consisting of the Chemistry Laboratory in West Vancouver and the Aquatic Toxicity Laboratory in North Vancouver, is jointly funded and staffed by DOE's Environmental Protection Service and DFO's Water Quality Unit. The lab provides analytical and advisory services to these two departments and to several other federal agencies.

The laboratories provide three major services--routine, emergency and legal. High volume routine analyses are supported by a variety of sophisticated instrumentation and data processing equipment. Emergency response services are provided to ensure that field staff can have accurate data to react rapidly. Legal analytical services are available to produce data for use in court proceedings. Laboratory staff are qualified to present such data as expert witnesses.

In addition to these three major services, staff offer advice and expertise in interpretation of analytical data and resolution of chemcial or biological problems. Some method development capability is maintained, both to ensure that cost-effective, state-of-the-art analyses are provided and to support new or changing user requirements.

In 1982, the laboratories received 1,254 batches of samples from more than 200 user groups. Approximately 185,000 results were reported from a wide variety of analyses conducted on fresh and marine waters, effluents, sediments, biological tissues and air samples. Major areas receiving laboratory support were regulatory and

In 1982, the CNR derailment on the Thompson River caused a petrochemical spill that brought related environmental concerns to the forefront.

enforcement programs, the Salmonid Enhancement Program, environmental assessment and fisheries research.

Major developments in 1982 included:
- sample management and accounting system: providing up-to-date information on analytical progress and sample status and accurate monitoring of laboratory usage and costs charged to user groups
- automation of mercury, arsenic and selenium analyses
- modified sample processing procedures: including new sampling, sieving and digestion procedures for soils and sediments and new digestion procedures for water and liquid effluent samples
- ethylene dichloride toxicity study
- cyanide determinations: methods for cyanate, thiocyanate and weak acid dissociable cyanide implemented
- flow-through bioassay facilities
- DOE/DFO Environmental Laboratory Manual update.

Contact: Paul D. Kluckner,
Manager,
Laboratory Services.

Water Use

Freshwater Management Section

The Freshwater Management Section is primarily involved in hydroelectric project impact assessments and related utilization/compensation negotiations, thermal power project impact assessments, water management studies, resource maintenance flow studies and reviews of water licence applications to determine screening requirements and the need for establishment of resource maintenance flows.

a) NCPC Whitehorse Rapids Hydro Project

The hatchery being built by the Northern Canada Power Commission (NCPC) at its Whitehorse Rapids hydroelectric station on the Yukon River is nearing completion. The hatchery is to compensate for mortalities of chinook smolts by the station's turbines. The Minister of Fisheries and Oceans requested that a hatchery be constructed to offset the turbine mortalities.

The commission has also been asked to provide a tailrace screen to prevent upstream migrants from entering the tailrace channel and being trapped or injured.

b) Kemano Completion Project

During 1982, Habitat Management continued environmental studies relating to the fisheries resources of the Nechako, Morice and Kemano Rivers.

Since a court injunction was granted to the Department in 1980, the Minister has prescribed the flow regime in the Nechako River in order to provide adequate spawning, incubation and rearing habitat for chinook and sockeye salmon. The discharge regime established in 1980 was reinstated in 1981 and 1982 by mutual agreement between the Department, the International Pacific Salmon Fisheries Commission and the Aluminum Company of Canada.

In 1982, the Department completed studies to assess rearing requirements of juvenile chinook salmon in the Nechako through an intensive downstream trapping/fry-marking program and an investigation of fish food resources. An incubation study to determine the effects of freezing temperatures on egg and alevin survival was also initiated during the winter of 1982.

In the Morice River, the habitat requirements and overwinter survival of side channel-rearing chinook and coho salmon and steelhead trout were assessed in a joint study conducted by the Department and Envirocon Ltd. (consultant to Alcan). A report on the Department's studies since 1980 in the Morice and Nechako Rivers is in preparation.

Alcan's consultants have recently released fisheries flow recommendations for the Nechako, Morice and Nanika

Rivers and these are presently under review by the Department.

c) Stikine-Iskut Hydro Project

The B.C. Hydro Stikine-Iskut proposal involves a 1,950-megawatt project slated to be in service October 1993. Two dams are proposed on the Stikine at the Stikine Canyon and Tanzilla sites. Two dams are also proposed in the Iskut basin at Iskut Canyon and More Creek. In addition, a diversion dam is proposed to provide additional water to the More Creek dam site from Forest Kerr Creek. All dams are upstream of the known distribution of salmon.

B.C. Hydro, the State of Alaska and the U.S. Department of Fisheries are conducting studies into potential downstream environmental impacts of the proposed developments. Potential concerns involve changes in river morphology, such as channel simplification, alteration of temperature and flow regimes, reduction in sediment load, and the associated impacts of these potential changes on salmon habitats. Habitat Management Division is involved in reviewing the research to determine its adequacy, and to recommend further studies if required, to assure that major impacts on fish populations are identified and resolved.

Habitat staff will continue to review reports from B.C. Hydro and to advise them on future studies.

d) Seton Creek Hydroelectric Facilites

The Seton Creek power plant, which became operational in 1956, is located approximately one kilometre downstream from the mouth of Seton Creek on the Fraser. Water is conveyed to the power plant by means of a two-kilometre-long power canal leading directly from Seton Lake. Salmon stocks destined for Seton Creek and Seton Lake are delayed at the power plant for substantial periods, and many suffer head injuries which occur in the draft tube of the power plant.

Since 1972, several methods have been used in an attempt to mitigate this problem. The latest and most promising method appears to be the partial diversion of Cayoosh Creek, a tributary of the Seton River, into Seton Lake. Studies done in 1979 to 1981 revealed that a reduction of the proportion of Cayoosh Creek water in Seton Creek and an increase of Cayoosh water in the formerly pure Seton water entering the power canal resulted in a very significant reduction of delay at the tailrace and an increase in numbers of fish readily migrating up into the Seton system.

A solution to the problems associated with delay and mortality of downstream smolt migration has yet to be found.

e) Falls River Hydroelectric Project

In 1981, B.C. Hydro proposed to update its hydroelectric generating station approximately 53 km southeast of Prince Rupert. The powerhouse is located near the confluence of the Falls and Enstall Rivers, approximately 600 meters upstream from the mouth of the Falls River.

In July, the B.C. Utilities Commission authorized B.C. Hydro to commence work immediately and to complete the project by 1985; the Commission also stipulated that B.C. Hydro must negotiate with the Department on matters pertaining to the maintenance of the fisheries resources.

B.C. Hydro has retained D.B. Lister and Associates to conduct the spawning studies. The consultants have submitted their report, and negotiations continue with Hydro regarding mitigation.

Due to budget constraints, B.C. Hydro has deferred redevelopment plans until 1987-1990.

f) Nicola River

HMD has completed a report of its biological and engineering studies of

the Nicola and Coldwater Rivers. The studies were undertaken over the last two years to determine fisheries flow requirements. It is part of the "Strategic Planning" study of the Nicola basin initiated in 1980 by the Planning Branch of the B.C. Ministry of Environment.

A key component of the Nicola Plan is the proposed reconstruction and upgrading of the outlet structure on Nicola Lake, which would provide increased storage and better regulation of flows.

g) Tsulquate River

In 1974, the District of Port Hardy authorized a major study to develop a water supply. Consultants recommended in the ensuing report that the old water supply works on the Tsulquate River be abandoned and a new project be implemented with a storage dam at the outlet of Kains Lake. The consultants reported that the proposed Kains Lake dam would provide 2.4 million cubic meters of storage. The new project consists of an overflow weir and pumping station located above a falls, impassable to fish. While approving water licence application authorizing the diversion and the use of 6.8 million liters of water a day, the Comptroller of Water Rights stated in 1977 that flows must be released for the maintenance of the fisheries resource. This stipulation was made upon the request of the Department.

h) Koksilah River

The problem of low summer flows on the Koksilah River and its tributaries has been aggravated in recent years by an increasing demand for water for irrigation and domestic use.

At the request of the Water Management Branch of the provincial Ministry of Environment, DFO reviewed the minimum flow requirements for preservation and maintenance of the fisheries resource.

Analysis of field data has now been completed. A report, with recommended flows for the tributary streams, is forthcoming.

i) Englishman River

The Town of Parksville has made application for a water licence to divert water from the Englishman River for domestic water supply purposes. Based on studies conducted in 1979, the Habitat Management Division has recommended that storage be provided to support the proposed water licence during the critical low flow period. This would not change flows downstream of the point of diversion; however, increased flows upstream could provide benefits to fisheries. The regional water manager has recommended to the Comptroller of Water Rights that a clause be inserted into the licence, requiring the proponent to release water from storage upon request. This would occur when natural flows dropped to the identified critical level. A report on the biological and engineering studies substantiating these requests has been completed.

j) Duteau Creek

Several years ago, 1.2 million cubic meters of water storage was obtained to enhance fisheries in Duteau and Bessette Creeks. This project also provided additional storage for the Vernon Irrigation District. The District operates all the associated storage and diversion structures controlling downstream flows in Duteau Creek; this includes releasing suitable flows for fisheries. In addition to the storage for enhancement, the District should be releasing natural maintenance flows, but they have not yet cooperated in this respect.

k) Okanagan River

The Okanagan Basin Implementation Board has requested an investigation into the possibility of increasing maximum permissible flows along the Okanagan River channel below Vaseaux Lake because the present limitation of

28.3 cms as specified for sockeye incubation and emergence, is insufficient to draw Okanagan Lake down quickly enough during years of high runoff. If more water could be spilled between November 1 and April 30, lake levels could be better controlled and, in addition, impacts on shore-spawning kokanee would be reduced.

A report on the results of studies undertaken in 1981 has recently been completed.

1) Coquitlam River

The Coquitlam River siltation problem which came up a few years ago is still not adequately controlled. Silt discharges from gravel mining operations were entering the mainstream river and threatening salmon spawning beds. The problem was identified in a 1978 federal/provincial water management report, and at that time, the Department advised substantial improvements for gravel removal and silt control to comply with Fisheries Act requirements.

A considerable amount of engineering work has been done by consultants for the gravel mining operators. There has been some difficulty in implementing engineering designs, however, because of the reluctance of the operators to revise traditional methods and the high costs of removing and disposing of the silt material. Nevertheless, drainage control has been improved by developing bypass systems and settling ponds. More work is required with respect to pit drainage, settling ponds and overall mine planning before the siltation problem is completely solved.

Foreshore Management

The Foreshore Management Section works with District staff in reviewing major port, marina, real estate and other types of development proposals in estuarine and marine areas to preserve and protect productive fish habitats. Because of the relationships between the control of land use and related activities on the part of other government agencies (federal, provincial and territorial) and our responsibilities for preservation of productive fish habitats, the Unit often represents the Department on various foreshore management and planning task forces, working groups and interagency studies.

a) Roberts Bank Superport

The National Harbours Board's expansion of the Roberts Bank superport in the Fraser River estuary was recently subjected to an Environmental Assessment and Review Panel (EARP) review, at which the Department successfully defended the position that full-scale expansion was unwarranted and unacceptable. EARP subsequently recommended to the federal Environment Minister that a reduced expansion should proceed. An Environmental Review Committee is providing environmental advice on construction of a three-pod expansion which was eventually approved.

Port expansion started in September 1981 and primarily involved suction dredging and land reclamation. This phase of port expansion should be completed early in 1983. An ongoing program of monitoring the biological impacts of dredging commenced in the summer of 1981 and will continue until dredging is complete.

A habitat compensation fund of more than $1 million was part of Treasury Board approval for this project. This

This crab monitoring screen will be held in position under a dredge pipe outfall at Roberts Bank.

fund should allow the Environmental Review Committee to meet its objective of preventing a net loss of productive habitat. This habitat compensation fund has now financed programs (crab habitat loss study, and eelgrass study) to help define the habitat that has been and is going to be lost. This information will be used to decide the measures to be taken to meet the goal of no net loss of habitat. To date, no money has been spent on habitat acquisition or creation, but concepts currently under consideration include creation of eelgrass beds, artificial reefs and artificial salt marshes.

b) North Coast LNG Proposal Review

Dome Petroleum Ltd. has proposed a liquified natural gas (LNG) terminal at Grassy Point, near Prince Rupert. A special interagency task force has been established to measure navigational and environmental risks associated with the location and operation of the terminal.

The task force concluded that:

- major environmental concerns along the marine approach routes were treated in a comprehensive fashion and that this facet of the project was environmentally acceptable
- there were numerous data deficiencies at the terminal site and few specific design details
- it was premature to judge the accuracy of statements regarding environmental impact near the terminal.

Several environmental studies will be carried out by Dome and their consultants to address the data deficiencies. During 1983, the studies should be completed, and the project's implications to the fisheries resources will be analysed.

c) Arctic Offshore Development

A major activity this past year has been the coordination and review of the Beaufort Sea Environmental Impact Statement produced by the major oil companies, who wish to go from an exploration phase to a production phase. The current proposal includes a scenario of massive dredging in Yukon waters (for island construction) as well as port development and possible processing facilities on the Yukon Coast. Both a technical review and DFO position paper should be finished in 1983 for presentation to the federal Environmental Assessment and Review Panel who are assessing the projects' impacts (and recommending how to deal with them) for the federal Minister of the Environment.

A survey along the Beaufort Sea coast at King Point, Kay Point and Shingle Point was carried out to determine migration patterns and timing of anadromous fish along the coast at the site of the proposed port development at King Point by Dome Petroleum Ltd.

d) Tsawwassen Salt Marsh Dike Alignment

In the early 1970s, construction of a flood control dike around the Tsawwassen Indian Reserve salt marsh was stopped in order to ensure protection of productive fish habitat. This year, the Tsawwassen Indian Band commissioned a habitat study to resurvey the marsh and make recommendations on future dike alignments. That report has now been received by DFO for Departmental review. During 1983 DFO will be working with the Tsawwassen Band, and the Department of the Environment (Inland Waters Directorate) to ensure that Fisheries concerns regarding possible future dike alignments are dealt with satisfactorily.

e) Campbell River Resource Surveys

In light of several development proposals for the Campbell River area, the Unit recognized a need to collect biophysical data for the Campbell River foreshore to complement data collected in the Campbell River estuary in 1980. An extensive field program involving DFO and job creation workers was undertaken in 1982 to gather data pertaining to juvenile salmonid utilization of the marine foreshore area.

Results of the 1982 field program are being assessed and a report will be

Biological technicians survey fish habitat at a proposed marina site.

produced describing the biophysical resources of the Campbell River foreshore.

f) Fraser River Estuary Study

Phase II of this study, initiated in 1980, was completed in 1982 and has been submitted to the federal and provincial Ministers of Environment for consideration. The Department's input to the phase II process centered around the task of "area designation." General agreement has been reached with other agency representatives on the priorities of more than 80 percent of the estuary shoreline. Designations used in the process include conservation, park/recreation, log storage, urban (mixed boat moorage and commercial), industry and port/terminal.

g) Yukon River Basin Study

The Yukon River Basin Study is a three-year, $2.2 million joint federal-provincial-territorial planning study being carried out under the auspices of the Canada Water Act.

The major objective of the study is to develop guidelines for water and related resource management. In developing the guidelines for recommendations, basic data on the river and its tributaries will be considered, including information on flora, fauna, fish and habitats. The study has recognized the imbalance of information on resource development initiatives and various resource bases and has budgeted funds to supplement the resource bases. Once the studies are completed potential development scenarios will be considered to evaluate the demands on the resources and to identify potential use conflicts.

In 1982 (the second year of the study), the Basin Study Committee approved a $400,000 fisheries study. Study accomplishments to date include completion of an annotated bibliography and information summary and fish distribution maps for the Yukon Basin. Programs ongoing and proposed (to be completed in 1983) include a salmon

tagging and radio tracking study, studies into the impacts of placer mining sediments on Arctic grayling and their habitat, stream surveys, limnological studies and a creel census.

h) North Coast Estuaries

i) Skeena Estuary

The Unit initiated a project to assist the Village of Port Edward by identifying foreshore areas suitable for various types of development.

Under the supervision of fishery officers, a job creation field crew assembled substrate composition and vegetation distributions information on resource maps.

Data are being analysed and a report, including recommendations on suitable foreshore development for various areas of the foreshore will be completed in 1983.

ii) Kitsault Estuary/Alice Arm

A foreshore plan is being developed for the head of Alice Arm. In 1982, a generalized survey of the habitat resources was undertaken.

Three watersheds and three marsh channels in the estuary were sampled to determine fish presence. Substrate composition and vegetation distribution in the estuary was also mapped.

The report being prepared will give recommendations regarding broad foreshore planning and development objectives as well as recommendations about a specific proposal for log dumps and a roadway on the intertidal foreshore.

iii) Stewart Estuary

The Unit initated a limited Stewart estuary study in 1982.

The estuary, fed by the Stewart River, Bear River and Rainy Creek supports populations of pink, chum, coho and sockeye salmon. The study gathered a small amount of data on their usage of the estuary and verified previous information collected by B.C. Ministry of Environment on estuary vegetation, hydrology etc.

During 1983, the data will be analysed and differences will be noted between the draft Foreshore Plan and the Department's recommendations to ensure the protection of productive fish habitat.

Contact: Rod Bell-Irving,
Chief,
Water Use Unit.

Management Services

The Management Services Division includes four major activities in the Regional office. The training and career development officer for FSB staff, the Licencing Unit, the Regulations and Enforcement Unit and the recreational fisheries coordinator are four independent activities in the Region, but they are closely tied with field operations.

During 1982, a number of "first time" events took place in the Division. The creation of the position of recreational fisheries coordinator has proven to be a valuable addition to Regional staff. The coordinator, acting as a liaison between the Sportfishing Advisory Board and Fisheries management, provided an improved focus on sportfishing concerns to the Field Services Branch.

A Licencing branch office opened in January 1982 in the north. Licencing also went through its first year of on-line computer administration; the change was a marked improvement over the old "card" system.

The Regulations Unit completed and introduced two major sets of regulations--the B.C. Sportfishing Regulations and the Pacific Fishery Management Area Regulations.

The Enforcement Unit undertook a major fish-buying operation in an effort to apprehend and charge illegal sellers of salmon taken from the Fraser River system.

Unfortunately, the position of the native Indian advisor was vacated early in the year, and subsequently not staffed during 1982 due to budget cutbacks. A new focus on native fisheries issues and policy is expected in 1983.

Contact: Alan Gibson,
Chief,
Management Services.

Recreational Fisheries Coordinator

This staff position was established early in 1982 as a step toward increased consideration of the burgeoning interest in recreational fisheries, both at sea and in tidal portions of rivers. (The management of non-tidal sport fishing is under provincial control).

The position was filled by a senior fisheries employee with long service in fisheries management and a good appreciation of recreational interests. The office took over much of the liaison on sport fish concerns that had temporarily been funnelled through the office of the sport fish advisor. The latter position, designed to serve advisory, research and ombudsman functions, led to the added position of sport fish coordinator.

The office of the sport fish coordinator has been busy from the outset. It has absorbed secretariat duties of the Sport Fishing Advisory Board, which had previously been administered by the sport fishing economist's office.

The coordinator's office has also dealt with a steady flow of interest from the public. As DFO responds ever more strongly to the huge clientele of non-commercial users of fishery resources, not to mention the services and industries that cater to that interest, the coordinator's function seems destined to expand.

Contact: Robert Wowchuk,
Recreational Fisheries
Coordinator.

Recreational Fisheries Advisor

The position of Recreational (sport) Fisheries Advisor was established early in 1979 to assess trends in sport fishing, which has become a "mushrooming" activity-industry, and to act as a liaison between the angler and the Department.

Trends in sport fishing and the proportional allocation of a share of the resource to the angler and tourist are noted and assessed. Each year, the sport fish advisor has been involved in the discussions over proposed fishery regulations and has worked with the Communications Branch and the Operations Room, through which most fishing reports are funnelled.

Operating under the advisory terms of reference of the position, the sport fish advisor has been successful in persuading some fishery managers to reconsider concepts in needs and allocations. One case in point is the change in the regulations which restricted the number of rods used by anglers in boats to one rod per angler. The current regulation allows an unlimited number of rods, provided that all anglers in the boat are legally covered--either by a licence or as a minor--for angling.

In addition to attending management and other discussion meetings, the sport fish advisor has been consulted by employees on various sport fishing concerns. These range from allocation of salmon fisheries between sport and commercial fishing to angler regulations and even angler attitudes.

Close contact is maintained with the larger organized groups of anglers, such as the B.C. Wildlife Federation, the Steelhead Society of B.C., the Pacific Salmon Society, the B.C. Federation of Flyfishers and the charter-boat organizations.

In this fourth year, 25 public appearances were made before angling clubs, service clubs, fishing guides' meetings, public protest meetings, conventions, Salmonid Enhancement Task Group meetings, Sport Fishing Advisory Board meetings, and radio and television talk shows.

Eight regional conferences of sporting groups and fishery and resource agents were attended.

The depletion of steelhead trout and chinook and coho salmon stocks has resulted in the decline of river fishing, and a similar pattern is evident in lake fishing. Lakes in congested areas, such as Merritt, Kamloops, and the Okanagan, continue to be "fished down" each spring, leaving scant stocks remaining for renewed activity in the fall.

Sea-angling success for chinook and coho salmon appeared reduced everywhere in 1982, except in Alberni Inlet and Barkley Sound, where salmon enhancement measures have brought about spectacular chinook returns. Thousands of chinook and coho were intercepted in mixed-stock fisheries by commercial boats in Johnstone and Juan de Fuca Straits, targetting upon the return of sockeye and chum salmon.

Contact: Lee Straight,
Recreational Fisheries
Advisor.

Training and Career Development

The Training and Career Development Unit continues to provide training for all DFO employees. In 1983, the Unit will continue to be very involved in the preparation and initiation of the national Fishery Officer Career Progression Program, from the recruit level to the working level (a two-year structured program). In addition to providing training to DFO staff, the Unit also offers its services on Pacific coast fisheries concerns to the RCMP, Coast Guard, and industry (particularly logging).

In addition, the Unit has been asked for input into various studies, including:

- study of opportunities for training and placing BCIT graduates
- BCIT Basic Resources (Modular) Instruction for Development Growth and Employment (BRIDGE) through BCIT Distance Education
- fishery officer career progression plan
- Pacific Region's enforcement capabilities.

This Unit also serves as a member of these committees:

- National Uniform Committee
- Lateral Transfer Committee
- Vehicle Acquisition Committee
- Equal Opportunities for Natives
- Training Committee
- Native Employment Committee.

The Unit continues to provide information to educational institutes and serves directly on advisory boards for the Kelsey Institute of Technology, Sask.; the British Columbia Institute of Technology, Burnaby, B.C.; Lethbridge Community College, Alta.; and Selkirk College, Castlegar, B.C.

The Unit also serves on the accreditation committee of the Society of Engineering Technologists of B.C. (SETBC) for BCIT's Forestry Technology course, and on the advisory committee for the Enforcement Technology course at Lethbridge Community College.

Increasingly, the Unit is also being called upon to provide training for Support Services. SEP has also indicated a desire to participate in some aspects of Field Services training.

As a sideline to training, the Unit is Field Services staff's contact for the Employee Assistance Program. This program provides confidential assistance, advice and support to employees whose work performance is, or likely to be, affected by a personal or health-related problem.

Contact: Brian Richman,
Branch Training and Career Development Officer.

Field Services Systems

Regulations

The Regulations Unit maintains regulations governing the various fisheries, in keeping with the changing conditions and circumstances of the fisheries. A number of amendments were prepared and forwarded to Ottawa in 1982 for promulgation. The total volume of amendments handled by the Ottawa Regulations Unit is creating considerable delays; therefore, it is important that the Regions submit proposed amendments in a more organized fashion.

This Unit also monitors enforcement/court proceedings and provides legal advice and assistance to field officers in enforcement activities. In 1982, 1,429 prosecutions were entered for the Region; this is a 50 percent increase over the 952 prosecutions registered in 1981.

Contact: Mel Hart,
Chief,
Regulations Unit.

General Investigations

The manager of the Fraser River, Northern British Columbia and Yukon Division requested an undercover operation be conducted in 1982. The operation, approved by the director, Field Services Branch, began in June.

The purpose of the program was to determine the extent and scope of illegal sale of salmon in the Fraser Valley area.

A former RCMP officer was engaged as the operator of a fish company. He was backed by other members of the Unit and personnel from Districts 1 and 2.

The first buy was made on July 9 and the last one was on October 1, 1982. A total of 55.8 tonnes of salmon were bought.

As a result of this operation, it is expected that approximately 340 charges will be laid against 129 individuals.

The results of this program indicate that the illegal sale of salmon, by unlicenced operators, is very large and is capable of generating large amounts of money.

The other major highlight of this endeavor was the high degree of cooperation that was exhibited among the various people who participated in it.

A worthwhile achievement in 1982 was the development of a compendium of Fisheries case law. The compendium is available for distribution to fishery officers and others interested in the prosecutions of Fisheries violations. The work, entailing extensive research and organization, is the effort of court liaison officer M. E. Bogart.

Contact: Tom Moojalsky,
Chief Enforcement Officer.

Licencing

Licencing administration took a giant leap forward into the computer age in 1982 with completion of the final phase in the implementation of an on-line computer system. Benefits accruing from this change included improved service to the public, better and more timely data for Fisheries managers, and reductions in staff overtime.

The opening of a Licence Section office in Prince Rupert January 1982 also contributed to an improvement in service to the public. This step toward decentralization has proven convenient for DFO staff, particularly in the North, who can now refer fishermen to the Prince Rupert Licencing office to settle licencing problems, obtain replacement plates, validation tabs and decals, and to be advised in a comprehensive and informed manner on all aspects of licencing.

Microfilming of 500,000 licencing records (1968 to 1981) was begun in 1982. In three months' time, almost half of the documents were filmed. The target for 1983 is to complete the filming and to prepare a comprehensive catalogue for the tapes.

By year-end, the final draft of the "Pacific Fishery Registration and Licencing Regulations" consolidated package was ready. It was expected to go forth for enactment early in 1983. These regulations consolidate present licencing policy and administrative procedures, as well as introduce several new licence categories which have in the past been regulated through issuance of permits. This draft represents four years of coordinated effort by licencing regulations, and legal services sections. The proposed regulations represent a vast improvement in clarifying licencing policy and procedures for both the staff and the public.

A five-year personal commercial fishing licence was introduced in 1982. This eliminated the need for fishermen to reapply for a licence each year. Available at a fee of $40, it proved to be very popular with fishermen. More than 1,800 were issued from the Vancouver, New Westminster, Nanaimo, and Prince Rupert offices.

The tidal water sport fishing licence program entered its second year in 1982. Over 650 agents were contracted to sell licences, with sales exceeding 286,000 licences and generating $1,722,300 in revenue. The revenue from this program is being assigned to SEP. Distribution of licences and monthly/year-end reconciliations have proven to be extremely labor intensive. Consequently, improvements to the efficiency of the system are being sought in 1983.

Contact: Dick Carson,
Licence Manager.

Table 61

1982 Prosecutions

Fisheries Act (Section 19)	14
Fisheries Act (habitat-related)	19
Fisheries Act (other)	21
Coastal Fisheries Protection Act	12
Criminal Code	4
B.C. (General) Regulations	661
Licencing Regulations	72
Inspection Act & Regulations	4
Herring Regulations	7
Salmon Regulations	170
Shellfish Regulations	164
Yukon Regulations	6
Sportfish Regulations	266
Other Regulations	9
Total	1,429

Table 62

1982 Tidal Water Sport Fishing Licences

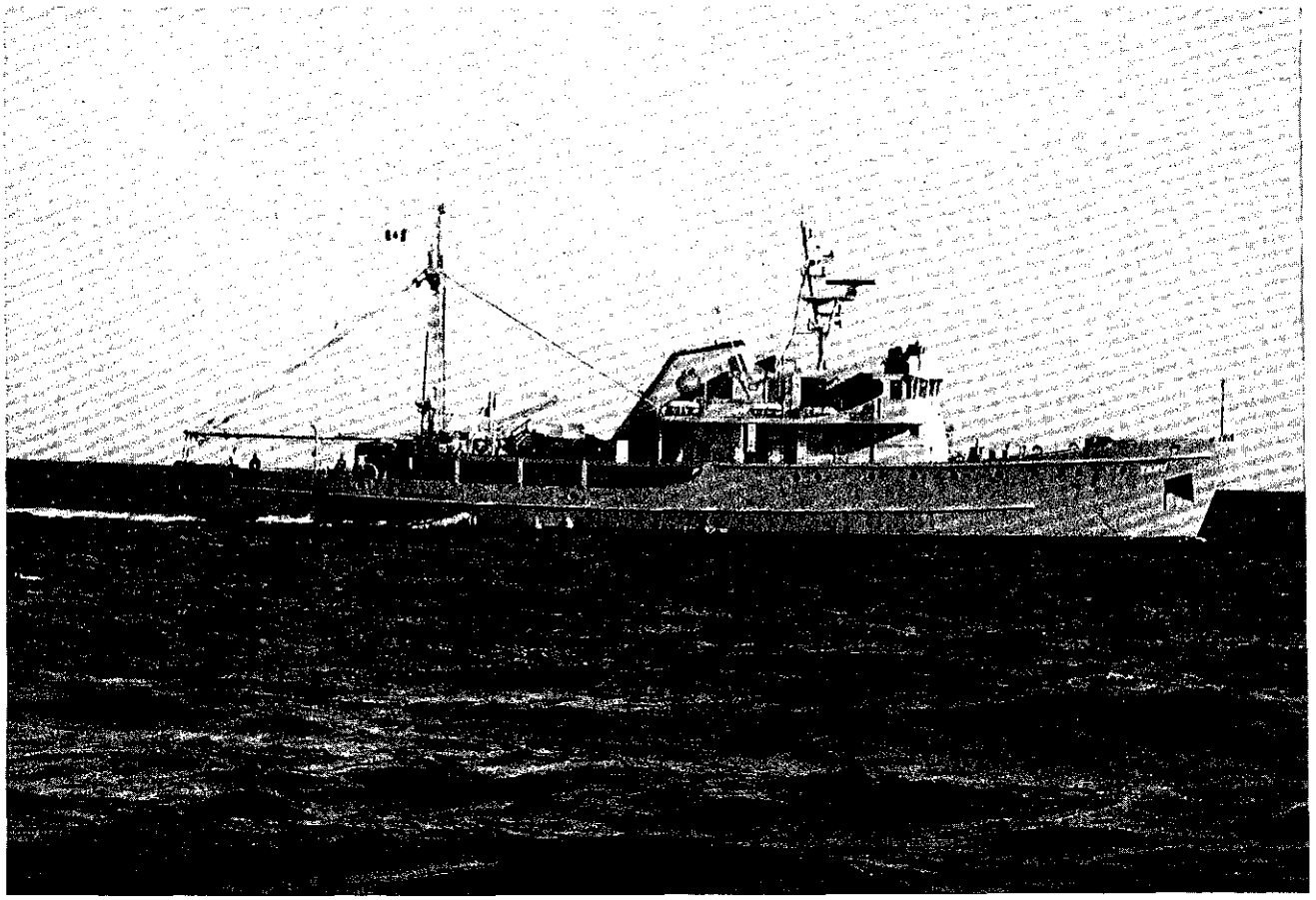
Type	Number Issued 1982	Number Issued 1981	Revenue 1982	Revenue 1981
Resident (R)	237,533	222,370	$1,186,050	$1,110,552
Non-Resident (N)	17,394	15,748	347,880	314,960
Non-Resident three-day (T)	11,947	11,156	119,470	111,560
Resident/Non-Resident one-day (D)	19,712	20,077	68,992	70,270
Total	286,585	269,351	$1,722,392	$1,607,341

Table 63

1982 Vessel Licences and Personal Commercial Licences*

Designation	Licence	Number Issued	Licence Value	Revenue
A-200	Salmon (vessel under 9.14 m)	273	$ 200	$ 54,600
A-400	Salmon (vessel over 9.14 m)	3,269	400	1,307,600
A-800	Salmon (vessel over 42.45 m^3)	577	800	461,600
A	Salmon (Indian-owned, reduced fee paid)	358	20	7,160
B	Salmon (10 years only)	168	20	3,360
C	Groundfish	1,072	10	10,720
D	Packer	209	10	2,090
E	Abalone	26	200	5,200
H	Roe Herring (gillnet)	935	200	187,000
H	Roe Herring (seine)	190	2,000	380,000
H	Roe Herring (Indian gillnet)	404	10	4,040
H	Roe Herring (Indian seine)	56	10	560
K	Sablefish	45	10	450
L	Halibut	433	10	4,330
S	Shrimp (by trawl)	247	10	2,470
T	Groundfish (by trawl)	147	10	1,470
One-year	Personal Commercial	15,437	10	154,370
Five-year	Personal Commercial	1,872	40	74,880
				$2,661,300

* These are preliminary figures.



The FPV Tanu patrols the coast.

Ship Division

Ship Division, one of seven divisions within the Support Services Branch, is responsible for providing Field Services Branch with the vessels and crews necessary for the effective management of the Pacific coast fisheries.

The fleet consists of 31 patrol vessels, ranging in size from 10 - 55 meters. The two headquarters' vessels, Fisheries Patrol Vessels (FPV) Tanu and James Sinclair, are assigned to coast-wide patrols. The remainder of the fleet is assigned to various districts and subdistricts on an "as required" basis.

In addition to managing the patrol fleet, Ship Division is also responsible for the management and operation of the Fisheries Research Vessels (FRV) G.B. Reed and Caligus, based at the Pacific Biological Station, Nanaimo.

FPV Laurier

The FPV Laurier was removed from active service on April 1, 1982, due to a realignment of Regional priorities.

Patrol Vessel Replacements

In accordance with the Departmental Vessel Acquisition Strategy Plan (VASP), a number of inshore patrol vessels are to be replaced over the next decade. To ensure that the patrol vessel needs of this Region were addressed, Ship Division and FSB representatives developed a conceptual vessel design to meet Regional requirements.

The design subsequently resulted in a full specification for a Class 56 inshore patrol vessel.

FPV James Sinclair

To increase her operational efficiency and effectiveness, FPV James Sinclair was "double crewed" in July 1982.

Search and Rescue (SAR)

In addition to their fisheries management duties, three patrol vessels (Tanu, Chilco Post and Arrow Post) were multi-tasked to a Fisheries/SAR role. These vessels participated in 72 SAR incidents; 75 other incidents were handled by the remainder of the fleet.

To meet the Department's commitment to SAR, several vessel masters from the headquarters' fleet participated in an intensive, three-week SAR course at the Transport Canada Training Institute in Cornwall, Ont.

Surveillance Duties

A total of 324 domestic and 90 foreign vessel boardings were conducted by the two headquarters' vessels.

Contact: Capt. B. Gordon Irving,
Chief,
Ship Division.

Table 64

1982 SAR Incidents Responded to by Fisheries Patrol Vessels

	Multi-tasked Vessels	Single-tasked Vessels
Fire	1	2
Disabled	32	40
Sinking	9	17
Overdue	6	2
Grounding	12	3
Medical	6	3
Overboard	2	1
Miscellaneous	4	7
Total	72	75

1982 Total - 147
1981 Total - 167
1980 Total - 217
1979 Total - 228
1978 Total - 141

The FPV James Sinclair completed its second year of service in 1982.

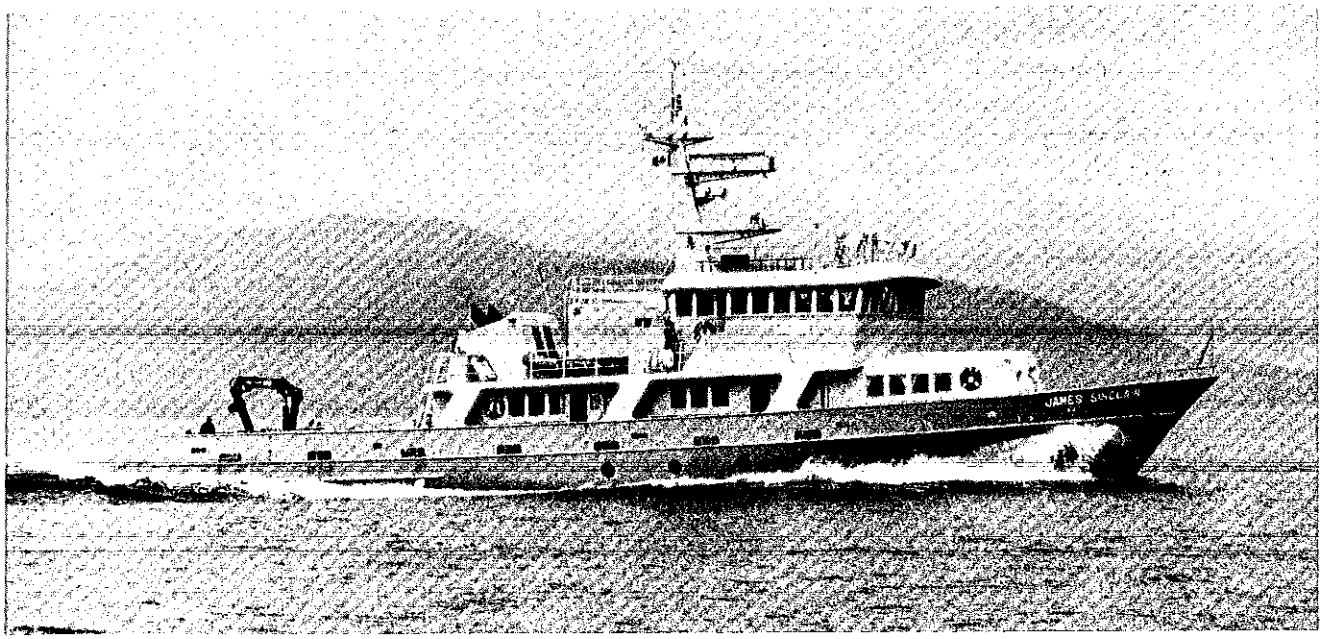


Table 65
1982 Fisheries Patrol Vessels

Vessel	Operational Port	Masters
Double-crewed Vessels - Multi-tasked		
Arrow Post	Queen Charlotte City	J. Robinson R. Paziuk
Chilco Post	Alert Bay	R. Mason R. Maratos
Tanu	Victoria	A. Preston O. Nilssen
Double-crewed Vessels - Single tasked		
James Sinclair	Victoria	J. Gosse H. Connor
Single-crewed Vessels		
Anchor Rock	Victoria	J. Forgie
Atlin Post	Nanaimo	J. Bumpus
Babine Post	Kitimat	L. Helsing
Beaver Rock	Prince Rupert	J. Christie
Bonilla Rock	Campbell River	R. Davis
Brama	Westview	J. Zitzewitz
Caligus	Nanaimo (Research)	R. McLaughlin
Comox Post	Port Alberni	J. Thompson
Cutter Rock	Prince Rupert	D. Prevost
F.D. 202	Tofino	E. Arnet
Falcon Rock	Dawsons Landing	R. Skog
G.B. Reed	Nanaimo (Research)	A. Fletcher
Gale Rock	Bella Coola	L. Malo
Gull Rock	Quatsino	-----
Heron Rock	Tahsis	-----
Kitimat II	Prince Rupert	W. Wylie
North Rock	Kitimat	-----
Petrel Rock	Prince Rupert	K. Gale
Pillar Rock	Masset	L. Rivest
Seal Rock	Port Hardy	J. Scott
Sooke Post	Queen Charlotte City	K. Harley
Star Rock	Steveston	C. Forbes
Stuart Post	Steveston	R. Harris
Surge Rock	Bella Bella	E. Wilcox
Temple Rock	Bella Coola	H. Veelbehr
Vedder Rock	Vancouver	-----
Warrior Rock	Vancouver	K. Cox
H.Q. Relief	Victoria	R. Myerscough
South Relief	New Westminster	B. Murray
South Relief	New Westminster	R. Alton
North Relief	Prince Rupert	F. Jackson
Supervisor	Prince Rupert Marine Station	P. Lloyd
Supervisor	New Westminster Marine Depot	A. Zanatta
Supervisor	Nanaimo Marine Station	J. Brennan

Fisheries Development

The Fisheries Development Program provides a means for DFO to offer the fishing industry financial and technical assistance in developing the commercial fisheries, in concert with good fisheries management practice.

Conducted under the terms of the Fisheries Development Act, the program is administered by the Fisheries Development Division. However, the resources of other DFO branches and divisions are often utilized to carry out the wide variety of projects undertaken.

Projects are carried out in five major areas:

a) Gear development, to achieve:
- better selectivity
- reduction of energy consumption
- better quality of catch
- new gears for new species
- improved operating safety
- reduced repair costs.

During 1982, a project utilizing the remote-controlled underwater vehicle MANTA (developed by Sea-I-Research Ltd. of Sidney, B.C.) demonstrated the excellent potential for the use of this equipment in studying the performance of fishing gear and the reaction of fish to the gear. A video-tape produced from trawling operations has generated great interest from commercial fishermen. The MANTA can be used to observe longlining, trapping, trawling, seining, and trolling operations and will be very useful in projects to improve the selectivity of these gears.

Two gear selectivity projects were conducted in 1982; one experiment involved the MANTA and the M/V Walker Rock to determine the feasibility of using colored, large-mesh panels in the bunt of a salmon seine to permit escapement of juveniles; the other experiment, conducted by Northern Operations, involved the study of various salmon gillnet hanging ratios to improve selectivity in a mixed-stock fishery. Promising results were obtained from both projects and the work is expected to continue.

b) Vessel development, to achieve:
- energy savings
- improved fish handling methods
- improved chilling, refrigeration and freezing systems
- better safety.

In 1982, a two-year project was initiated to study the Pacific fishing fleet's fuel consumption, as well as methods to reduce consumption. The project, funded by the Economic Policy Branch in Ottawa, is being carried out by UBC's Department of Mechanical Engineering.

Other projects included: live herring transfer, RSW (refrigerated salt water) temperature control and recording system, development of nickel-plated copper chillers.

c) Exploratory fishing, to achieve:
- resource surveys
- exploring new grounds
- exploring for unutilized and underutilized species
- developing new fisheries.

In 1982, an experimental trap fishery operation for octopus in the Clayoquot Sound area was carried out by Simon Fraser University. The project was undertaken by SFU in collaboration with a commercial fisherman, with funding from DFO and the Department of Supply and Services Unsolicited Proposal Program.

The results of the project indicated that there is potential for a small commercial fishery, which has generated

DFO staff collect wind row herring spawn at French Creek; the spawn will be transplanted elsewhere.

considerable interest from commercial fishermen.

There were also exploratory fishing for: king crab, octopus, loligo squid and nail squid. A monitoring program of tuna was also undertaken.

d) Handling and processing improvement, to achieve:
- improved quality
- quality control
- greater efficiency
- energy savings.

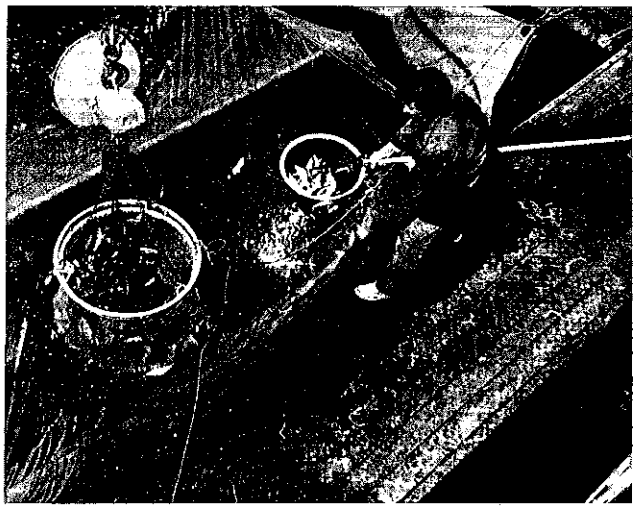
A project initiated in 1980 to develop commercial systems for the live storage and depuration of shellfish has achieved considerable success. At the Fisheries Technology Laboratory, a prototype live holding tank for prawns has proven successful on a pilot scale and it is now ready for testing on a commercial scale.

An interesting offshoot of the project surfaced during depuration studies--the ability of magnesium to gape, or open, oysters. This revelation resulted in commercial field trials to utilize this effect as a shucking aid. The trials were successful. Consequently, Esperanza Sea Farms Ltd. applied for a temporary marketing authorization to evaluate this technique in a commercial shucking operation.

e) Mariculture and impoundment, to achieve:
- resource enhancement
- controlled harvesting
- more intensive use of available habitat
- continuity of supply
- improved quality.

A roe herring ponding research project, started in 1980 at the Pacific

Biological Station, achieved very good results during the 1982 roe herring season. Mature herring were impounded for up to 75 days after capture. Survival rates were excellent. The fish were captured in early January; the quality of the roe increased to a peak by late March, with 71 - 89 percent at a rating of "No. 1 and No. 2 mature," and the quality remained high for three weeks or more. A total of 38.3 tonnes of roe herring were marketed on a trial basis at $ 1,271 per tonne and the quality drew favorable comment by the processor. The roe yield measured by the standard test averaged 13.7 percent.



In an experimental herring ponding project, roe herring is removed from the pond at Departure Bay and transported to the processor.

Another project of particular interest, which was started during the 1982 roe herring season, will determine the feasibility of enhancing the herring resource by salvaging windrow eggs from the beaches and transplanting them in suitable habitat to hatch the eggs and rear the larvae to the juvenile stage. The project is being carried out by Tidal Rush Marine Farms Ltd., under the terms of the DSS Unsolicited Proposal Program. The results of the project have so far been encouraging; herring roe was salvaged from French Creek and successfully transplanted and hatched at Hidden Basin, Nelson Island.

An informational film on this project, entitled Herring Egg Salvage and Transplant, has been produced and it is available from the Communications Branch. The culture of blackcod and abalone were also undertaken in 1982.

In addition to these projects, three fishery industry projects were conducted under the Program for Industry/Laboratory Projects, funded by the National Research Council:

- the development of a prototype temperature-monitoring system for freezer vessels by Pulsar Electronics, Ltd.
- the development of an industrial prototype of the Fisheries Technology Branch jet-assisted air-lift pump by Shields Industries Ltd.
- pilot commercial impoundment and rearing of blackcod in pens by Westerly Fish Farms Ltd.

Contact: Bob McIlwaine,
Chief, Fisheries Development Division.

An octopus is caught in a tube trap in an experimental fishery.

Headquarters Support

Herring Coordinator

The Regional Herring Coordination Center was formed in 1978 to act as a focal point for all matters concerning the management of B.C. herring stocks. The members of the herring management team, such as the fishery managers, researchers and biologists, and all parts of the fishing industry, such as the fishermen and processing companies can bring their concerns to the Center for discussion. Rational management is more apt to be achieved with this well-defined consultative process.

In 1981, the area licence system was instituted, and in 1982 a more refined version was adopted. The refinements were specifically in the process of selection of areas by fishermen. Although catch goals were not realized by the seine sector in 1982, the area licence system was used again in 1983. Prospects for reaching catch goals by the fleet will be enhanced under the new fixed quota management system implemented for the 1983 roe fishery. This new system involves more management input from the Fisheries Research Branch than was the case in past years.

In 1982, an experimental boat quota system was used in the food and bait fishery to study the ramifications of this method of controlling this small fishery. The results are not fully analyzed at this time; however, it seems that boat quotas have one advantage over the open fishery because absolute control over catch levels are possible using the quota system, and available surplus can be put more effectively into higher value fisheries, such as the roe herring fishery.

Contact: Lloyd Webb,
A/Herring Coordinator.

Licence Appeal Board

In 1979, a Licence Appeal Board was established in the Pacific Region. The Board, comprising five voting members appointed by the Minister, advises on the granting or refusing of appeals concerning licencing that are directed to the Minister.

Any person whose request for the issuance, transfer or reclassification of a commercial fishing licence has been refused by the Vessel Licence Appeal Committee may appeal to the Minister. After interviewing the appellant, the Board makes a recommendation to the Minister on each appeal.

The guidelines under which the Board operates are the same as those issued by the Licence Appeal Committee--to review licencing procedures to ensure that regulations are met. Appeals usually involve circumstances in which a vessel is lost through sinking or accident, or vessels are tied up due to litigation or illness, death or accident suffered by the licensee or a close relative.

The Licence Appeal Board can advise the Minister to grant appeals on grounds of compassion or to use similar Ministerial discretion.

In 1982, the Licence Appeal Board considered 108 appeals, and approval was recommended in 38 of them.

Contact: Phil Murray,
Chairman,
Licence Appeal Board.

Table 66

1982 Decisions by Licence Appeal Board

Licence	Approved	Denied	Total
Salmon (A)	17	25	42
Salmon (B)	6	6	12
"C" Licence (unrestricted fisheries)	4	9	13
Roe-on-kelp	2	5	7
Roe herring	5	9	14
Sablefish (blackcod)	1	5	6
Halibut	-	3	3
Shrimp	3	8	11
	38	70	108

Licence Appeals Committee

Since the implementation of a limited entry program for the salmon fishery in 1968, there has existed an avenue through which fishermen may appeal decisions made by the Licence Section on the issuance, renewal and transfer of commercial fishing licences.

The function of the Vessel Licence Appeal Committee is to ensure that regulations and guidelines of the licencing procedures have been met. It reviews the decision made by the Licence Section with respect to the fishermen's initial application and investigates all aspects of the appeal. It may also consider information and documentation which may not have been available to staff in the Licence Section. The Committee then makes a ruling, based somewhat on precedents.

If the appeal is denied by the Committee, the appellants can state their cases by letter, to the Pacific Region Licence Appeals Board. The Board reports directly to the Minister of Fisheries and Oceans.

The Committee currently consists of three persons: a chairperson and two members. Most of the routine appeals, where precedent has already been established, are handled and processed solely by the chairperson. The Committee chairperson also holds the title of licence appeals officer.

In cases where the appeal is unusual or controversial, the chairperson refers the matter to the two Committee members. The Committee members are drawn from Departmental staff and take on the responsibility in addition to their regular duties.

Appeals received are usually for:

- additional time to obtain or complete a replacement vessel
- exemption from the $500 landing requirement for "C" licenced vessels
- change of vessel or area for roe herring licencing.

Often, Canada's economic situation is being used, in part, as a basis for appeals. This is especially true for appeals for additional time to replace vessels and increases in replacement vessel lengths and tonnages. Two years ago, fishermen felt confident they could afford new vessels. They now find that building a vessel is far too costly, and they must locate suitable vessels from within the existing

Table 67
1982 Decisions by Vessel Licence Appeal Committee

Licence	Approved	Denied	Total
Salmon (A)	90	29	119
Salmon (B)	5	9	14
"C" Licence	60	16	76
Abalone	0	0	0
Geoduck	0	0	0
Roe herring	88	5	93
Sablefish	0	2	2
Halibut	5	8	13
Shrimp	8	1	9
Groundfish (trawl)	4	2	6
Total	260	72	332

fleet. Unlicenced vessels that match their overall length and net tonnage limits are difficult to find.

Another major source of licence appeals are those received from fishermen who file late applications for their licences. In 1982, there were 44 appeals arising from late applications, and of these 41 were for herring licences.

In 1982, the chairperson assisted the Licence Section on special projects, including the consolidation and revision of the new Licencing Regulations.

Another important aspect of the work is to interpret Departmental regulations, policies and procedures for fishermen, discussing items in detail, including the history and rationale of rules and regulations. In most cases, it is time well spent.

Contact: Wendy Grider,
Licence Appeals Officer.

Salmon Coordinator

The position of Regional salmon coordinator, established in 1981, is the focal point for salmon management matters. The position was filled on March 1, 1982, and the salmon coordinator is based at Regional headquarters.

During 1982, the coordinator provided a link between divisions and headquarters and advised the director and director-general on major developments in the salmon fisheries. Considerable time was also spent on the Canada/U.S.A. salmon negotiations, development of fishing plans for 1983, and longer-term planning related to the recommendations from the Pearse Commission on Pacific Fisheries Policy and to SEP's Phase II.

In response to widespread concern regarding CWT (coded-wire tag) mark recovery data, the coordinator reactivated the Regional Mark Recovery Users' Committee and also established a new Technical Steering Committee. These committees are optimistic that many of the ongoing problems related to the mark recovery program can be corrected in 1983.

The coordinator has a responsibility to provide functional direction to management biologists. An attempt was made in 1982 to address this and other responsibilities by setting up a Regional Salmon Management Working Group, which comprised representatives from the Field Services Branch, SEP, and the Fisheries Research Branch. The group met only once, as in-season and post-season activities seemed to take priority over additional meetings. The need still exists for interaction within this group, and it is hoped that it will be active and effective in 1983.

Contact: Dave Schutz,
Regional Salmon Coordinator.

Salmon Services

The Salmon Services and Special Projects Unit receives funding from both FSB and SEP to carry out the province-wide Mark Recovery Program and fish ageing service (Regional Scale Lab). These programs collect data on the size and age of salmon and recover coded-wire tags and fin marks from B.C. fisheries. The Salmon Services Unit also participates in commercial and sport log-book programs, coordinates the purchase and supply of coded-wire tags for marking, coordinates the reporting of coded-wire tag and fin-clip release information to the Pacific Marine Fisheries Commission, and coordinates and processes recovery information on Floy and Petersen disc tagging projects.

Mark Recovery Program

The Mark Recovery Program samples a portion of all B.C. commercial and sport fishery catches for salmonids carrying coded-wire tags (identified by absence of adipose fin), dissects the heads of these marked fish and decodes the tags. The program also samples for fin-marked fish (identified by absence of fins other than adipose) and collects biological samples for age information. These data are collated and distributed to Fisheries biologists and hatchery managers.

In 1982, commercial catches of chinook, coho, steelhead, chum and pink salmon were sampled at processing plants in Prince Rupert, Namu, Port Hardy, Tofino, Ucluelet, Vancouver, and Steveston. Six crews sampled 1,281,518 fish; collected heads from 20,781 adipose marks; recorded 1,676 fin marks and collected 61,090 biological samples. These figures indicate a 70 percent increase in numbers sampled and a six percent increase in adipose marks over 1981. These increases reflect the first year that a directed effort has been made in sampling chum salmon coast wide for coded-wire tags. Sample numbers for coho also dramatically increased over 1981, reflecting the increased catch of coho.

Voluntary returns of sport recoveries continued in 1982, but the number of recoveries was down 20 percent from the previous year. This decrease may be attributed to a reduction in marking of Canadian coho and to a decline in fishermen participation. During 1982, the program processed 8,000 heads turned in at 160 head depots located at boat docks, tackle shops and Fisheries offices throughout B.C.

Fishermen who turn in the heads of adipose-only clipped fish receive information on the origin of their fish, a Mark Recovery Program button and a copy of the Salmonid newsletter. They are also eligible for eight annual prize draws of one $500 prize and six $50 prizes. In 1982, all $500 winners were from Vancouver Island, 39 of the $50 winners were from B.C. and 2 were from the United States. Of the fish caught by prize winners, 14 were from Capilano hatchery, seven were from Quinsam hatchery, five were from Big Qualicum hatchery, 15 were from other B.C. hatcheries and five were from American hatcheries. (These figures do not include those from the November/December 1982 prize draw.)

In addition to the dissection and tag reading of commercial and sport recoveries, the Head Recovery dissection lab provided support to other Fisheries projects by processing heads from escapement steelhead, chinook and coho. Also in 1982, support to research groups was given by processing smolts from an enumeration project in the Quinsam estuary. Other analyses included heads from a shaker study, heads from a troll observer program and an incidental recovery from a hake fishery trawler.

Data collected by the Mark Recovery Program was processed by computer. An on-line entry system enabled the program to process the data as it was received. Throughout 1982, in-season reports were distributed to provide the users with up-to-date information. The 1980 and 1981 annual reports were reformatted and readied for publication.

In 1983, improvements to the present system of data entry and retrieval are expected. Some special user group reports, such as an annual review of sport recoveries, commercial troll newsletters, and summaries of Petersen disc tagging, may be produced. Data from 1980, 1981 and 1982 mark recoveries will be published and distributed.

Table 68

Sample Numbers and Mark Recoveries of Each Species Sampled in 1982

Species	Sampled	Adipose Marks	Fin Marks
Chinook	279,248	6,776	0
Coho	655,907	13,626	0
Steelhead	8,556	129	0
Chum	335,000	250	1,651
Pink*	2,807	0	25
Total	1,281,518	20,781	1,676

* Pink salmon were sampled only in Johnstone Strait to assess the contributions from Bear River, Quinsam and Puntledge hatcheries.

Biological Sampling

In 1982, the biological sampling program was executed by the Mark Recovery Program, under the direction of the Regional chinook and coho biologist. Extra staff was supplied by the Summer Student Youth Employment Program; they sampled chinook, coho, steelhead and chum for scales, lengths and weights. The students also distributed commercial troll log-books and collected the completed log-book sheets from the fishermen.

The scales collected were read by the Regional Scale Lab. The data provided specific age information on commercially-caught chinook and added to the laboratory's library of scale information.

Table 69

Biological Sampling in 1982

Species	Samples Taken
Chinook	32,961
Coho	13,097
Steelhead	982
Chum	14,050
Total	61,090

Petersen Disc and Floy Tagging

The Mark Recovery Program also coordinates information from Petersen disc and Floy tagging programs. Files are kept on each tagging project, recording where and when the tagging was done, why the tagging was done, which species were tagged and the numbers tagged. In addition, fishermen who return the tags are notified of prize draws and rewards (if applicable) and are informed of the project for which their tags were used.

The International Salmon Tagging Program (ISTP) conducted under the interim U.S./Canada Salmon Interception Agreement, was initiated in 1982. More

than 200,000 tags were applied to sockeye and pink salmon. DFO's Northern Operations, in conjunction with ISTP, applied an additional 3,800 tags to sockeye and chinook. A total of 1,525 return envelopes, each containing one to 10 tags, were received from fishermen. Participating fishermen became eligible for a total of $10,000 in prize money through five prize draws held during the season. Recoveries from the ISTP were sent to the Pacific Biological Station.

Other tagging projects were conducted on the Babine, Nimpkish and Kennedy Rivers, in Cumshewa Inlet, and on various rivers feeding the Fraser River. During 1982, 244 letters were written to fishermen and $39 in rewards ($1 per tag) were issued.

The Mark Recovery Program office stores an inventory of discs, pins, washer and baffles that are available on request.

Contact: Vic Palermo,
Biometrician Programmer;
Don Bailey,
Chief, Salmon Services.

Regional Scale Laboratory

The Fish Morphology Lab conducts ageing of all species of salmon and certain freshwater fish.

Approximately 410,080 scales, including those from juvenile fish, were submitted for analysis in 1982. This is an increase of more than 93,000 from 1981. Also received were 4,772 otolith and 1,075 fin clips from spawning ground chum and sockeye samples.

Due to a shortage of trained personnel, 28 percent of all scales received have not been read; only 22 percent of the otoliths and none of the fin clips received have been read.

Liaison with other agencies--the Washington Department of Fisheries, University of Washington's College of Fisheries, and Alaska Department of Fish and Game--provided an opportunity to exchange information, expertise and scale impressions, in conjunction with stock separation programs involving B.C. and Alaska chinook stocks. Scale impressions from fish from all major B.C. river systems were made for U.S. files.

In addition, lab staff conducted scale analyses in the field (for approximately six weeks) for stock separation of the Nimpkish sockeye run.

In conjunction with the Pacific Biological Station, scale lab staff established reliable criteria for ageing geoduck. Acetate impressions of the geoduck shells were made and then aged, using projection equipment and microfiche. Confidence levels were also established.

A display, with hands-on activities relating to the ageing of fish by scales, otoliths and fin rays, was set up at the Arts, Science and Technology Museum in Vancouver.

As in previous years, tours of the lab were available to both staff and the public.

Contact: Yvonne Yole,
Supervisor,
Regional Scale Laboratory.

Appendices

Appendix A: Key Field Services Branch Staff

DIRECTOR'S OFFICE, FIELD SERVICES BRANCH

Director	Don Wilson	666-1751
Program Planning and Evaluation	Frances Dickson	666-1519
Administration Officer	Gillian Trushel	666-3284
Herring Coordination Center	Bob Humphreys	666-1207
Fisheries Development Division	Bob McIlwaine	666-2685
Salmon Coordinator	Dave Schutz	666-1497
Regional Chinook and Coho Biologist	Ken Pitre	666-3512
Chief, Salmon Services	Don Bailey	666-2606

MANAGEMENT SERVICES DIVISION

Division Chief	Alan Gibson	666-1589
Recreational Fisheries Coordinator	Bob Wowchuk	666-1419
Recreational Fishing Advisor	Lee Straight	666-2768
Regulations and Investigations	C.C.(Tinker) Young	666-2185
Investigations	Tom Moojalsky	666-2185
Regulations	Mel Hart	666-2185
A/Commercial Fisheries Licence Manager	Dick Carson	666-2076
Licencing Unit Administrator	Eileen Brady	666-3160
Licence Appeals	Wendy Grider	666-1647

SOUTH COAST DIVISION

Division Chief, Nanaimo	Dennis Brock	753-1268
Senior Management Biologist, Nanaimo	Don Anderson	753-1268
A/Senior Habitat Biologist	Bruce Hillaby	753-1268
District Supervisors		
Port Alberni	Don McCulloch	724-0195
Nanaimo	Kip Slater	754-3257
Campbell River	Norm Lemmen	287-2102
Victoria	Larry Duke	388-3252

FRASER RIVER, NORTHERN B.C. AND YUKON DIVISION

Division Chief	Fred Fraser	524-7141
Assistant Area Manager	Bob Humphreys	524-7466
Senior Management Biologist	Robin Harrison	524-7143
Senior Habitat Biologist	Otto Langer	524-7146
District Supervisors		
New Westminster	Don Aurel	524-7181
Kamloops	Grant Scott	374-4322
Whitehorse	Gordon Zealand	403-667-2235

NORTHERN OPERATIONS BRANCH

Director, Northern Operations Branch	Eric Kremer	624-9137
Area Operations Manager, Prince Rupert	Tom Perry	624-9137
Senior Management Biologist, Prince Rupert	Paul Sprout	627-8730
Senior Habitat Biologist	Denis Rowse	624-9385
District Supervisors		
Prince Rupert	Gus Jaltema	624-9137
Kitimat	Willie McKenzie	632-6158
Queen Charlotte	Chris Dragseth	559-4413

OFFSHORE DIVISION

Division Chief	Ed Zyblut	666-3167
Offshore Management Operations	Keni Lorette	666-1511
Special Programs and Management	Barry Ackerman	666-3991
Offshore Surveillance and Enforcement	John Cairns	666-1912
Operations Center	Vilma Miller	666-1583
Sport Fishing Information		666-3169
Commercial Openings and Closures		666-1583

INSPECTION DIVISION

Division Chief	David Bevan	666-1478
Operations Manager	Charles Campbell	666-1801
Engineering	Ian Devlin	666-1288
Shellfish Coordinator	Rudy Chiang	666-3342
Boat Inspection	Klaus Schallie	666-6706
Vancouver Laboratory		
326 Howe St.		
Bacteriological Unit	Nick Neufeld	666-1552
Chemistry	Gin Farn	666-1554
Product Inspection	Wilf Gushue	666-6143
Northern Inspection District		
Prince Rupert	Vance McEachern	627-1375

FISHING VESSEL INSURANCE PROGRAM

Regional Manager	Audley Tinglin	666-3719
Assistant Regional Manager	Jock Embleton	666-3165
District Managers		
Prince Rupert	Rob Newton	624-9137
Steveston	Mac Chettle	274-7217
Nanaimo	Neil McAra	753-4051
Ladysmith	David Hayes	753-4051
Fraser Valley	David Dyck	274-7217
Vancouver - Sunshine Coast	William Lowe	666-8537
Claims Officer	William Guerin	666-2867

HABITAT MANAGEMENT

Division Head	Forbes Boyd	666-3282
Chief, Planning & Coordination	Tom Bird	666-1017
Chief, Land Use Unit	John Payne	666-1356
Chief, Water Quality Unit	Mike Nassichuk	666-1209
Chief, Water Use Unit	Rod Bell-Irving	666-8667

Appendix B: Advisory Committees

The following committees on specific fisheries are sponsored by the Field Services Branch of the Department of Fisheries and Oceans, Pacific Region.

SKEENA ADVISORY COMMITTEE

	Members
Fisheries Association of B.C.	2
Prince Rupert Fishermen's Cooperative	1
United Fishermen and Allied Workers' Union (UFAWU) (one seiner, one gillnetter)	2
Northern Trollers' Association	1
Nishga Tribal Council	1
Native Brotherhood of B.C.	1
Provincial Government	1
B.C. Wildlife Federation	1
Pacific Salmon Seiners' Association	1
Pacific Gillnetters' Association	1
Gitskan-Carrier Tribal Council	1

Terms of reference: to provide input into the management plan for the development and management of runs into the Skeena River.

Chairperson: Eric Kremer, Director, Northern Operations Branch, or Gus Jaltema, District Supervisor

QUEEN CHARLOTTE ADVISORY COMMITTEE

	Members
Seine Vessel Owners*	2
Gillnet Vessel Owners*	2
Troll Vessel Owners*	2
Fisheries Association of B.C.	2
Prince Rupert Cooperative	1
B.C. Wildlife Federation	1
Pacific Salmon Seiners' Association	1
UFAWU	1

*Residents of Queen Charlotte Islands

Terms of reference: to advise on all fisheries matters related to the Queen Charlotte Islands. Vessel representatives are local residents.

Chairperson: Eric Kremer, Director, Northern Operations Branch, or Chris Dragseth, District Supervisor

CENTRAL COAST ADVISORY COMMITTEE

	Members
UFAWU, Bella Coola Local	2
Bella Coola Band Council	2
Bella Bella Band Council	2
Kitasoo Band Council	2
Sport Fish Advisor	1
Owikeno Band	1
Pacific Salmon Seiners' Association	1
UFAWU Rivers/Smiths	1
Fishing Vessel Owners of B.C.	1

Terms of reference: to advise on all fisheries matters related to the Central Coast area.

Chairperson: Eric Kremer, Director, Northern Operations Branch, or Willy McKenzie, District Supervisor

FRASER RIVER ADVISORY COMMITTEE

	Members
UFAWU	1
Native Fishermen	2
Sport Fishermen	1
Fish & Wildlife Branch	1
Processing Industry	1
Independent Fishermen	7

Terms of reference: provide input into management plans for management and development of salmon runs on Fraser River.

Chairperson: Fred Fraser, Area Manager, Fraser River, Northern B.C. and Yukon Division

JOHNSTONE STRAIT-FRASER RIVER CHUM SALMON ADVISORY COMMITTEE

	Members
Pacific Gillnetters' Association	2
UFAWU	3
Native Brotherhood of B.C.	2

Terms of reference: to advise on Johnstone Strait chum salmon management. (The advisors are primarily representing themselves as fishermen. They represent their organizations only on a secondary basis.)

Co-Chairpersons: Dennis Brock, Area Manager, South Coast Division, Fred Fraser, Area Manager, Fraser River, Northern B.C. and Yukon Division

YUKON RIVER ADVISORY COMMITTEE

Membership: open to fishermen and processors.

Terms of Reference: the committee represents fishermen and processors of Yukon River and advises on development of the fishery and management of the runs, particularly in the Dawson area. The committee also advises on international matters.

Chairperson: Gordon Zealand, District Supervisor, Whitehorse, Yukon Territory

STIKINE RIVER ADVISORY COMMITTEE

Membership: open to fishermen and processors.

Terms of reference: the committee represents fishermen and processors of the Stikine River and advises on development of the fishery and management of the runs. The committee also advises on international matters.

Chairperson: Fred Fraser, Area Manager, Fraser River, Northern B.C. and Yukon Division

SPORT FISHING ADVISORY COMMITTEE

	Members
Amalgamated Conservation Society, Victoria	1
B.C. Wildlife Federation	1
B.C. Wildlife Federation, Lower Mainland	2
BCWF, Northern Interior	1
BCWF, Southern Vancouver Island	1
BCWF, Mid to Northern Vancouver Island	1
BCWF, Southern Interior	1
BCWF, North and Central Coast	1
Unorganized Anglers	5
B.C. Motel, Resorts and Trailer Parks Assoc.	1
Marina Operators	1
Charter Boat Operators	1
Sport Fishing Institute of B.C.	1
General Tourism	1

Terms of reference: to advise on tidal and nontidal sport fish matters and to assist in disseminating information to the general public on matters pertaining to these fisheries.

Chairperson: Ralph Shaw,
1031 Fraser Street,
Kamloops, B.C.
V2C 3H8

HERRING INDUSTRY ADVISORY BOARD

	Members
B.C. Fishermen's Independent Coop. Assoc.	2
B.C. Independent Fish Producers' Assoc.	1
B.C. Seafood Exporters' Assoc.	1
Central Native Fishermen's Coop.	2
Prince Rupert Coop. Fishermen's Guild	3
Economic Development, Ministry of	2
Fisheries Assoc. of B.C.	2
Fishing Vessel Owners' Assoc. of B.C.	3
International Assoc. of Refrig. Warehousers	2
Native Brotherhood of B.C.	2
Pacific Gillnetters' Assoc.	3
Prince Rupert Fish Wholesalers' Assoc.	2
Prince Rupert Fishermen's Coop. Assoc.	2
Pacific North Coast Native Cooperative	1
Prince Rupert Vessel Owners' Assoc.	2
Pacific Trollers' Assoc.	2
Recreation & Conservation, B.C. Ministry of	2
Salt Water Sport Fishing Adv. Committee	1
United Fishermen and Allied Workers' Union	2
B.C. Wildlife Federation	1
Pacific Coast Fishing Vessel Owners' Guild	1
Prince Rupert Fish Coop. Guild	1
Deep Sea Trawlers	1

Terms of reference: to provide input into the planning, development and management of the herring fisheries.
Chairperson: Don Wilson, Director, Field Services Branch

HERRING SPAWN ON KELP

	Members
Industry	1
Licence Holders	6

Terms of reference: to advise on the planning and development of the herring spawn on kelp fishery.
Chairperson: Paul Sprout, Senior Management Biologist, Prince Rupert

GROUNDFISH ADVISORY COMMITTEE

	Members
Prince Rupert Fishermen's Co-op.	1
Northern Industry	1
Southern Industry	2
Trawl Fishermen	3
Marine Resources Branch	1
B.C. Independent Fishermen's Co-op.	1

Terms of reference: to advise on planning and policy development of groundfish, especially with respect to fisheries management.
Chairperson: Ed Zyblut, Chief, Offshore Division

Appendix C: Publications List

Brett, J.R. and Solmie, A. 1982. Roe herring impoundment research: Report on the 1980/81 studies. Can. Tech. Rept. Fish. Aquat. Sci. 1061, 51 pp.

Delaney, P.W.; Kahl, A.L.; Olmsted, W.R.; and Pearce, B.C. 1982. Studies of chinook salmon (Oncorhynchus tshawytscha) in the Chilcotin River watershed 1975-1980. Can. Man. Rept. Fish. Aquat. Sci. 1674, 162 pp.

Fedorenko, A.Y. and Pearce, B.C. 1982. Trapping and coded-wire tagging of wild juvenile chinook salmon in the South Thompson/ Shuswap System 1976, 1979 and 1980. Can. Man. Rept. Fish. Aquat. Sci. 1677.

Fedorenko, A.Y. and Cook, R.J. 1982. Trapping and coded-wire tagging of wild coho juvenile in the Vedder/ Chilliwack River, 1976-1979. Can. Man. Rept. Fish. Aquat. Sci. 1678, 79 pp.

Fraser, F.J.; Starr, P.J.; and Fedorenko, A.Y. 1982. A review of the chinook and coho salmon of the Fraser River. Can. Tech. Rept. Fish. Aquat. Sci. 1126, 130 pp.

Gillis, D.J.; Whiting, C.A.; Radley, R.A.; Wilcox, J.E.S.; Ross, M.D.; and Jackson, K. 1982. Herring impoundment and pumping operations: Factors affecting the quality of roe herring products. Can. Ind. Rept. Fish. Aquat. Sci. 130, 61 pp.

Harbo, R. 1982. "Diving fishermen," Diver Magazine. Vancouver: Seagraphic Publications, June 1982, pp. 20-23.

Schubert, N.D. 1982. A bio-physical survey of thirty lower Fraser Valley streams. Can. Man. Rept. Fish. Aquat. Sci. 1644, 130 pp.

Schubert, N.D. 1982. Trapping and coded-wire tagging of wild coho salmon smolts in the Salmon River (Langley) 1978-1980. Can. Man. Rept. Fish. Aquat. Sci. 1672, 68 pp.

Appendix D: Field Services Offices