Field Services Branch

1980 ANNUAL REPORT

Fisheries and Oceans
Pacific Region

Government of Canada
Fisheries and Oceans

Gouvernement du Canada
Pêches et Océans

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Editor: Maxine Glover

Director's Report

I am pleased to present the 1980 annual report of the Field Services Branch of the Department of Fisheries and Oceans, Pacific Region. This Branch is the largest in the Department, with responsibilities ranging from the management of the fisheries to habitat protection, fishing vessel insurance, inspection, licencing, fisheries development, and offshore fishing and surveillance.

Field Services Branch received additional funding in 1980 which has helped to improve its management and enforcement capability over the short and long term. Fourteen fishery officer trainees were recruited, of which four are native Indians. Seven biologists and technicians for the management biology support units will also be hired. Four additional positions are being staffed for habitat protection duties in field locations; another four are being decentralized from headquarters in Vancouver to more effectively respond to habitat issues in the field.

Additional funds were used by the Habitat Protection Division to conduct field studies on the effects on juvenile chinook salmon of low water flows in the Nechako River. This became necessary when the Aluminum Company of Canada, which controls the Nechako water flows through its dam and spillway, for a time during the summer refused to release what the Department considered to be acceptable rearing flows for the juvenile chinook in the system. While the immediate situation was resolved in the courts, these field studies will help in the development of standards for adequate water flows for juvenile chinook in this system.

Despite these gains, the demands on staff created by enforcement and increasingly complex fisheries management continue to grow, and the Branch still requires additional staff and funding to effectively fulfill its mandate.

Turning to the fisheries, in 1980 there were unprecedented closures for commercial and sport fisheries in order to conserve wild chinook stocks. On the bright side, in Area 23 (Barkley Sound), the sockeye catch of 700,000 was a direct result of lake enrichment being carried out under the Salmonid Enhancement Program.

In a continuing effort to better protect our fisheries and improve our management capability, a task force on habitat management was established in 1980 to examine ways the Department could improve its capabilities in habitat research, habitat protection, habitat enforcement and habitat enhancement. The Task Force met with industries and user groups, other agencies and various public bodies in order to determine how well or poorly the Department is perceived in these areas. The Task Force will report on its findings and recommendations in 1981.

The Branch continues to struggle with the question of resource allocation, and looks to the recommendations of the Pearse Commission on Pacific Fisheries Policy, presently underway, to provide some useful leads in this area.

I am impressed by the dedication of our staff who work diligently for the continuity of the fisheries resources and for the interests of the various user groups.

I trust you will find this report informative and a useful guide to members of the staff with whom you may need to work during the year.

D.D. (Don) Wilson
Acting Director
Field Services Branch

Fraser River - Northern B.C. and Yukon

The Fraser River, Northern B.C. and Yukon Divisional area embraces a wide spectrum of coastal and Arctic geography. It contains not only two of the largest river systems in North America, but also contains a wide diversity of habitat and climatic zones ranging from the wet rain forest of the southern coast to the dry desert-like areas of the Kamloops-Okanagan and the Yukon's high Arctic. The total Divisional area amounts to approximately 1.3 million square kilometres, more or less equally divided between the Yukon and B.C.

The population occupying the area is in excess of 1.65 million people, with the vast majority (1.3 million) living in the lower Fraser Valley downstream from Hope. Needless to say, this population exerts an enormous pressure on the salmon resource and its habitat. Within the Divisional area is found the largest segment of the native Indian community (more than 100 bands), one of the largest sport fishing fleets and the largest in-river commercial fishery found on the Pacific coast.

In both the Yukon and B.C., the growth of the residential population, and an economic environment which is fueling industrial activity (particularly placer mining in the Yukon) are creating demands upon Divisional staff which are all but impossible to adequately respond to. The mandate of the Department in the Yukon is even wider than that elsewhere, because of the added responsibility of managing all freshwater fish, in addition to salmon, in both commercial and sport fisheries.

Hydro dams and water diversions still remain the greatest threats to the Division's salmon resources. Dam proposals are being considered for many major systems such as the Yukon, Stikine/Iskut, MacGregor and Liard. In addition to proposed dams, current logging activities in essentially every watershed, water use conflicts of various kinds, and urban and industrial sprawl all taking their toll of the resource and its habitat almost to the breaking point.

Fishery officer patrols the Fraser River.

In 1980, unprecedented steps were taken in both the commercial and sport fisheries for the conservation of chinook salmon. Poor chum returns added the penultimate touch to a year of low returns for all other salmon species as well. Mother Nature added a final perverse twist when the Boxing Day deluge ended the year by creating extensive flood damage and substantial spawning area and egg loss in many areas of the watershed.

Contact: Fred Fraser, Division Chief.

Kamloops District

Headquartered at Kamloops, this District manages and protects the salmon resource located in approximately 220,000 km^2 of the Upper Fraser River watershed from North Bend at the south to Burns Lake on the west, Driftwood River to the north, and east of Tete Jaune Cache to near Revelstoke on the east, and to the U.S./Canada border at Osoyoos in the south.

The main function within this inland and most productive District are habitat protection, management of the Indian food fishery, and the enforcement of the regulations covering these matters. In addition to the District office in Kamloops, subdistrict offices are located at Prince George, Quesnel, Lillooet, Clearwater, and Salmon Arm.

Salmon Escapements

The 1980 cycle for sockeye was an "off" year throughout the District, with the exception of its dominant Chilko River run. Of the total escapement of 613,000, over 500,000 spawned in the Chilko system.

Escapement of coho to the Kamloops District was severely depressed in 1980. Coho escapement amounted to a dismal 8,000 from a brood year spawn of 17,000 in 1977. Escapement targets for the more than 40 systems that contain coho have been set at 110,000 to 120,000 spawners.

The chinook escapement throughout this District was up slightly from the disastrous 1976 brood year. Again this season, the mainstays were the lower Shuswap and Chilko Rivers, however, there were modest increases in most systems. Although the escapement is far below the desired levels, the slight increase experienced in 1980 can be attributed to the restrictions placed upon chinook harvesting.

Table 1

KAMLOOPS DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	613,000	(1976)	705,000
Coho	8,000	(1977)	17,000
Pink	--	--	--
Chum	--	--	--
Chinook	41,900	(1976)	34,000

Indian Food Fishing

Management of the Indian food fishery during 1980 did not involve the major problems of 1979. Although some individuals from various bands did not comply with the Fisheries Act and the British Columbia Fishery (General) Regulations, the number of instances were few compared to 1979.

Approximately 60 Indian bands, belonging to eight tribal district areas and band administrative councils situated throughout this District, participated in the Indian food fishery. Although patrols were extensive throughout the District, only four charges were laid with respect to Indians selling food fish or fishing during closed times.

Habitat

Habitat and habitat protection continue to be the highest priorities within the District. Up to 80 percent of the working hours of field personnel is occupied in habitat protection. Within the District there are 112 salmon-producing streams and rivers, and several large salmon producing lakes. The most productive sockeye grounds are found in the Shuswap, Chilko, Adams, Horsefly and Stuart Rivers.

Table 2

KAMLOOPS DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	99,905
Coho	30
Pink	--
Chinook	2,330

Four species of Pacific salmon--pink, coho, chinook and sockeye--utilize 675-700 kilometres of rivers in the District for spawning purposes. With ever-increasing human populations and activities, salmon bearing waters are being subjected to environmental pressures. Pressures include the forest industry, recreational developments, agriculture, urbanization, industry and mining, and their dependence upon water.

Further pressures include in excess of 100 wood processing manufacturers, six pulp mills (with plans for considerable expansion in the near future), two oil refineries, one brewery, one smelter and over 50 mines of varying capacity and modes of operation.

There are many relatively large population centres which are situated near many important migration routes and salmon spawning areas. Four cities, numerous towns, villages and communities discharge effluent, encroach, and generally make full use of fish-bearing waters.

The referral system is an integral part of the contact with industry and the general public. Referrals in this District include 500-600 forestry referrals, 700-800 water licence applications, as well as hundreds of placer mining applications, land use contracts, Navigable Waters Protection Act applications, herbicide and pesticide use applications, railway, pipeline and transmission lines construction referrals, and others.

Some of the major environmental concerns that are encroaching upon the fisheries habitat within the District are:

- Kemano II, the Alcan Aluminum Company's major dam/hydro development
- rapid expansion of forest harvesting throughout the District, as a result of recent changes to the B.C. Forest Act
- pulp mill expansion at Prince George and Quesnel
- expansion of industrial areas adjacent to the South Thompson River
- Hat Creek thermal power project and its potential for acid rain fallout
- urbanization and recreational development adjacent to Shuswap Lake, Mara Lake and tributary systems
- the Quesnel-Cariboo Rivers log drive (to be phased out in two years)
- continued escalation of placer mining activities in and adjacent to the Fraser River tributaries
- extensive railway construction involving twinning of CN railway lines adjacent to the Thompson and Fraser Rivers
- water utilization throughout the District for agricultural use, industrial development, and domestic use, e.g. Nicola River, Salmon River, Chilcotin River and Bessette Creek
- construction of the Coquihalla Highway.

It is becoming exceedingly difficult to manage fish stocks within the District.

Contact: Grant Scott,
District Supervisor.

New Westminster District

This office supervises the fisheries activities for most of the southwestern portion of the mainland of British Columbia. This includes a portion of the Gulf of Georgia and the Fraser River to Boston Bar. It also encompasses Howe Sound and the Harrison-Lillooet system. The District has a population of more than 1.3 million people. The management of the fisheries resource in an area of such sprawling urban and industrial development is a complex and multifaceted task.

Commercial Salmon Fishing

The 1980 commercial salmon fishery in the Fraser River opened on April 21, 1980 to 24-hour per week fishing. The Fraser River closed again to all commercial salmon fishing on June 2, 1980 and did not reopen until July 21, 1980. The fishery continued under the control of the International Pacific Salmon Fisheries Commission and the Department until October when very weak returns of chum salmon forced a closure.

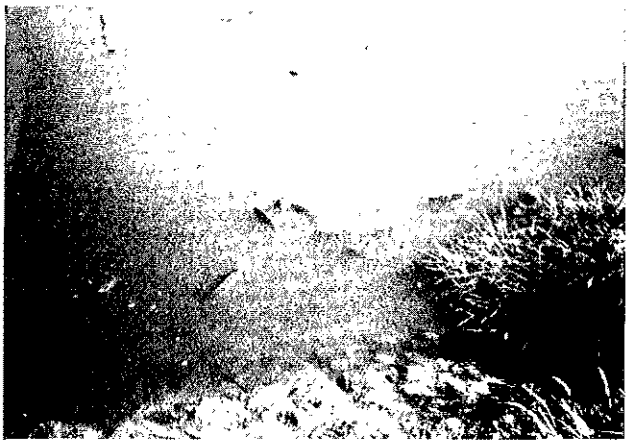
Table 3

NEW WESTMINSTER DISTRICT

1980 Commercial Salmon Catch

Species	Total
Sockeye	314,847
Coho	26,030
Pink	24
Chum	60,807
Chinook	35,192

* Figures from catch statistics



Fish kill on the Serpentine River, October 1980. The fish died from lack of oxygen caused by a combination of factors (warm weather, no rain, excessive nutrients from urban and agricultural development, an algae bloom and warm sluggish water).

The poor returns to the Fraser River of all species caused a very serious hardship on many commercial fishermen in 1980.

There are additional commercial fisheries in the District including those for crab, shrimp and prawn, eulachon, dogfish and smelt.

Sport Fishing

Sport fishermen can be considered a major user group. It is a primary recreation for a large portion of the population in the Lower Mainland.

The catches shown in the table do not necessarily indicate accurately the catches, but they do, however, show trends in the sport fishery.

In 1980, boat days were up almost 100 percent but catches were down. The increase in boat days can be partially attributed to the return of coho to the Capilano River. Low water flows in the Capilano held returning coho in the estuary and contributed substantially to the fishery off the mouth.

Table 4

NEW WESTMINSTER DISTRICT

1980 Sport Fish Catch

Species	Catch
Chinook	21,240
Coho	18,300
Steelhead	9
Pink	100

Other sport fisheries which have a large participation in this District are the smelt fishery in English Bay and the crab fishery from Boundary Bay around and into Burrard Inlet and Indian Arm. Success on this fishery is usually low, and many of the crabs caught are undersized.

A fishery officer and a technician from the Environmental Protection Service take legal samples of effluent from the Richmond landfill.

Indian Food Fishing

The District administers an Indian food fishery by issuing food fish licences, monitoring catches in the fishery for statistical purposes, and enforcing regulations pertaining to food fishing.

Table 5

NEW WESTMINSTER DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	86,065
Coho	29,397
Pink	--
Chum	12,333
Chinook	12,893
Steelhead	1,356

In 1980, a total of 671 licences were issued. The catches, as in the commercial fishery, were down considerably.

Salmon Escapements

Escapements of all species to most areas of the District were well below average. This was particularly true of chinook salmon. Chum escapement overall was low, however some of the smaller producers received an above average return, possibly because there was no fall chum fishery in the Fraser River.

Table 6

NEW WESTMINSTER DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	219,425	(1976)	227,425
Coho	86,025	(1977)	73,030
Pink	--	(--)	--
Chum	461,425	(1976)	369,825
Chinook	18,590	(1976)	16,650

Severe flooding in November and December caused damage to spawning grounds throughout the District. Losses were estimated in many areas at 50 percent and possibly as high as 90 percent in some watersheds.

Habitat

Habitat protection again, as in the past, proved to be a time-consuming duty in this District.

As the public becomes more aware of the importance of watercourses, the job of habitat protection is becoming slightly easier to handle. That small advantage is often overshadowed, however, by rapidly expanding urban and industrial development. Encroachment on the Fraser River estuary has not been halted completely but has been reduced significantly in 1980.

Table 7

NEW WESTMINSTER DISTRICT

1980 Habitat Protection Referrals

Type	Number
Land Use Applications	195
Timber Sale Applications	183
Water Licences	165
Pollution & Obstruction	496
N.W.P.A.*	98
Total	1,137

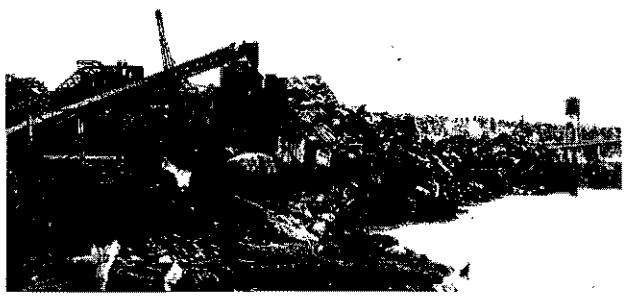
* Navigable Waters Protection Act

Enforcement

More time and energy is spent on enforcement in this District than on any other duty, because of the close proximity of a large population to so many fish producing areas. Enforcement on some fisheries, such as the sport and commercial crab and the Indian food fishery, is required year-round. Other fisheries require attention when in season, such as smelt, commercial salmon, eulachon, shrimp and prawn.

There was a total of 402 prosecutions initiated in the District in 1980. Many of these will still be in the court system late in 1981.

Contact: Don Aurel,
District Supervisor.



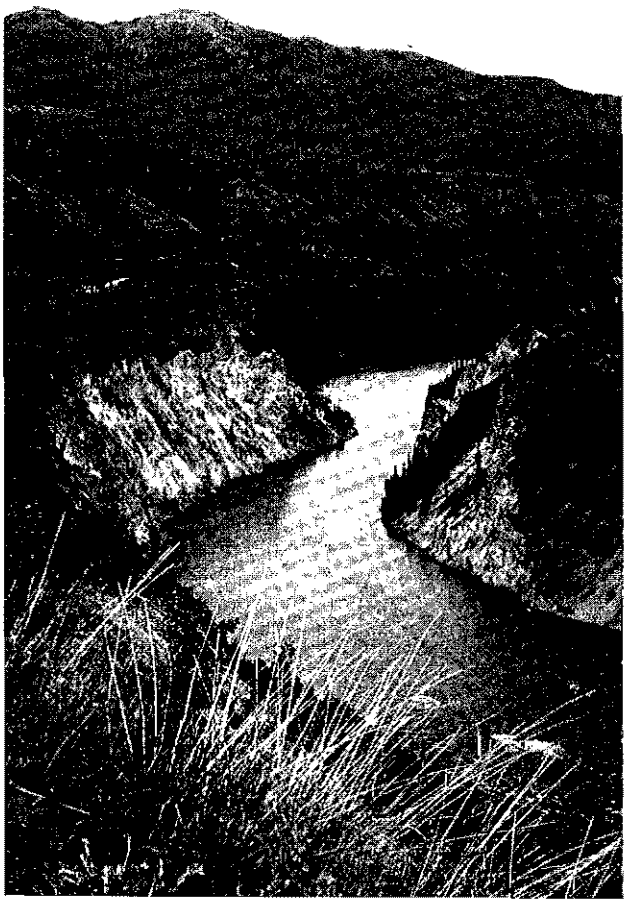
Heavy industrialization on the north arm of the Fraser River near Mitchell Island.

Whitehorse District

This District supervises operations from the Whitehorse office over all river and lake systems in the Yukon and northern British Columbia.

Management of commercial, domestic and sport fisheries and habitat protection, with the major emphasis on placer mining and hydro development, are the prominent concerns. A major responsibility not shared by any other district in the Pacific Region is the mandate for management of all freshwater species. In addition the District participates in joint U.S./Canada management activities for transborder river systems. Pipeline proposals, Indian food fishing, mining,

road construction, logging, seismic operations, and developments in many fields in the Beaufort Sea make up some of the activities in the Yukon and northern British Columbia.



The grand canyon of the Stikine River, just above Telegraph Creek.

The spotlight centered on three main areas in 1980: the International Salmon Agreement between Canada and the U.S. as it pertains to the transboundary rivers, placer mining, and developing a management plan for freshwater fisheries.

Commercial Fisheries

Better holding facilities and improved transportation were developed for the Stikine and Taku fisheries. The Yukon River fishery appeared to be off the ground early in the season with a barge-buying operation which picked up all the fish from the fishermen and then shipped them to southern markets. This ceased right at the peak of chinook fishing due to poor marketing and handling procedures. One fish plant should be in operation in Dawson during the forthcoming year; there are two proposals with significant financial backing on the drawing board.

There were four additional Taku River licences allocated to the Atlin Indian Band. On the Stikine, a small commercial fishery upriver was allowed, to supply the needs of the locals when the domestic fishery was eliminated in favor of the commercial fishery. The downriver fishery, which is the main fishery, was not eliminated.

Table 8

WHITEHORSE DISTRICT

1980 Commercial Salmon Catch

Species	U.S.	Canada
Sockeye	239,500	41,421
Coho	210,700	13,074
Pink	348,109	27,577
Chum	1,271,700	28,287
Chinook	209,300	11,369

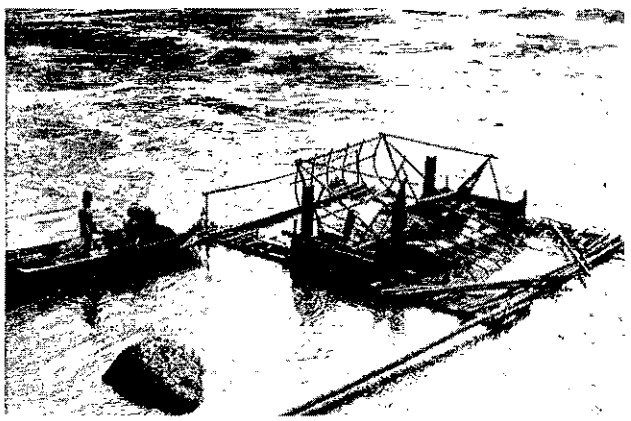
Table 9

WHITEHORSE DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Chinook	11,322
Chum	3,515
Coho	2,100
Sockeye	2,950

B.C. Packers is very reluctant to go back into the Stikine and Taku rivers due to financial losses in past years. It appears the fishermen have established their own marketing system as an alternative.



A fish wheel in operation on the Yukon River.

Sport Fishing

Residents continue to become more aware of river fishing for salmon in the Yukon, and some Europeans come to fish specifically for Klukshu salmon.

Table 10

WHITEHORSE DISTRICT

1980 Sport Fish Catch - Salmon*

Species	Catch
Chinook	550
Coho	200
Sockeye	800

* very limited information

A contract was let to H. Paish and Associates for a policy assessment of the Yukon sport fishery. This is scheduled for completion in March 1981. Two of the major issues facing this study were fly-in fishing operations and land tenure.

It is hoped that a policy plan will be established in 1981, with subsequent work to establish quotas on the various lake systems. With its high profile as a sport fishing area, the Yukon will require emphasis on sport fishing management and enforcement.

Salmon Escapements

Chinook escapements continued to brighten in all areas of the Yukon and northern B.C. The Yukon River had an excellent showing of 1,383 adults through the Whitehorse fishway, the best escapement since the fishway was installed in 1959.

The chum salmon return on the Yukon was very disappointing, with only 20,000-30,000 returning to the Fishing Branch River, and poor showings on the Pelly and the mainstem Yukon. The American commercial catch on the Yukon was 1,045,000 chum and 151,000 chinook. It should be noted the American subsistence catch (food fish--native and white) can be as much as 50 percent the size of the commercial catch.

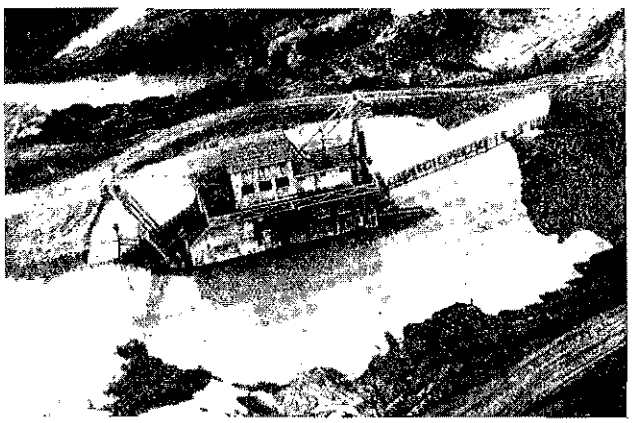
Table 11

WHITEHORSE DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year
Sockeye	82,308	(1976) 48,602
Coho	8,900	(1977) 5,919
Pink	60,000	(1978) 35,000
Chum	125,100	(1976) 20,000
Chinook	43,650	(1976) 4,499

The Taku River had a record return of sockeye and pink salmon. There were an estimated 250,000-400,000 pink on the spawning grounds in the Nakina alone. Chinook escapements improved, but chum and coho were disappointing.



The controversial dredging operation on Clear Creek by Queenstake Resources.

Coho escapements on the Stikine could best be described as a disaster, with less than 50 adults observed in aerial surveys. The Tahltan fence count was 11,018 sockeye, another poor return.

The Klukshu fence recorded an improved escapement of chinook, but another poor sockeye return. The early run of sockeye has been severely weakened by the American fishery and the Indian food fishery.

Habitat

Placer mining continues to be the number one habitat problem. There were more claims staked in 1980 than in the rush of '98, with even more extensive activity expected in 1981.

An extremely contentious issue is the dredging operation contemplated by Queenstake Resources on Clear Creek. They are looking for permission to dredge approximately 24 km of river bottom.

Placer mining is continuing to expand into areas of no previous activity. One major drainage system so affected is the Liard River, a tributary of the Mackenzie.

Land claims, a major issue in all areas, appear close to being settled in the Yukon. This should open the door for development in many areas. The key to all mining development is power. Once the power source is established, there are numerous mine proposals that could come on line.

Construction is scheduled to commence on the fourth turbine at the Whitehorse Rapids in 1981, along with more activity on both the Stikine and Liard systems in conjunction with hydro proposals for this area.

Table 12

WHITEHORSE DISTRICT

1980 Habitat Protection Referrals

Type	Number
Placer Applications	299
Land Use	235
Timber Data	8
Water Licence	7
Total	549

Public Information

Numerous meetings were held with concerned groups in both the Yukon and northern B.C. during 1980, with more scheduled for 1981. Yukon fishermen certainly cannot be accused of being apathetic about the resource. Several people travelled for three and four days by dog team to attend a meeting in Dawson in December of this year.

Contact: Gordon Zealand,
District Supervisor.

Management Biology

The biological support to the Division forms the basis for rational stock management.

Fraser River Chinook Test Fishery

A gillnet test fishery for chinook salmon was established in early June 1980 in the Fraser River, after the commercial fishery was closed due to below average abundance of chinook.

The site chosen was about one kilometre upstream from the Albion ferry crossing, just above McMillan Island. This test fishery continued to early October, when it was replaced by the chum test fishery at the same site. A total of about 800 chinook were taken during the three month period and there are hopeful signs that this program could develop into a reliable index of chinook abundance.

Commercial salmon fishing on the Taku River.

Fraser River Chum Test Fishery

Gillnet test fishing for chum salmon was conducted at two sites in the Fraser River during 1980 to determine the timing and relative abundance of Fraser River stocks. One site, located about ten kilometres upstream from the mouth of the river adjacent to Tilbury Island (Cottonwood Drift), has been used annually since 1963. The navigational buoy placed in the centre of the old drift in 1979 continued to hamper the operation of the test fishery and forced it to move about one-half kilometre upstream. In spite of this site alteration and increased boat traffic, the Cottonwood Drift provided valuable information for in-season management of Fraser River chum stocks. For instance, in 1980, early strength in the chum run was followed by depressed numbers in November. On the basis of this, only one river fishery was called, in spite of early season predictions of considerable run strength.

The other test fishing site is located on the Graveyard Drift next to McMillan Island, in the same location as the chinook test fishing. Test fishing at this site started three years ago so that there would be a back-up to Cottonwood data in view of the deterioration of the Cottonwood site. In general, there is substantial correlation between the two sites, both in estimated total abundance and in observed migration patterns.

Chum Tagging Off Sandheads

In mid-November 1980, chum stocks delaying off the mouth of the Fraser River were tagged. A 22 metre seiner was used to capture fish, operating over a four-week period from November 10 to December 10. A total of 1,008 tags were applied. Of these tags, 133 were recovered for a recovery rate of 13 percent. Most of the recoveries (109, or 82 percent) were in the river or on the spawning grounds. Recoveries in the Strait of Georgia accounted for another 21 (19 at Point Roberts and 2 at Sandheads). Only three recoveries came from southern fisheries: two in the San Juan Islands in Northern Puget Sound and one in the Hood Canal terminal fishery. Despite the late start of the program and the lack of river fisheries, this study yielded valuable information.

Klukshu River Counting Fence

A counting fence on the Klukshu River, a tributary of the Tatshenshini River, was operated for the fifth consecutive year in 1980. The fence is used to enumerate and define migration timing of sockeye, chinook and coho as an aid to regulating the Indian food fishery and a growing sport fishery located at the confluence of the Klukshu and Tatshenshini Rivers. In addition, information on the sex, age and size composition of these stocks is obtained. In 1980 a total of 11,750 sockeye, 2,637 chinook and 704 coho were counted through the fence. The sockeye and coho counts were well below average, while the number of chinook was about average.

Tahltan River Counting Fence

A counting fence located at the outlet of Tahltan Lake is used to provide an index of sockeye escapement to the Stikine River. The fence has been operated by Canada since 1977, but from 1959 to 1976 was operated by the Alaska Department of Fish and Game. During 1980, a total of 11,018 sockeye passed through the weir from July 4 to September 3, well below the 1959 to 1979 average of 16,831. In addition to determining abundance and migration timing, information on fish length, sex and age was obtained.

Kuthai Lake Counting Fence

A sampling weir was set up in mid-July on a Taku River tributary, the Silver Salmon River, near the outlet of Kuthai Lake in order to enumerate the sockeye run to this stream. A total of 1,658 sockeye was counted through the fence of which 356 were sampled. The sockeye spawning in Kuthai Lake were found to be considerably smaller than those sampled in the Taku River commercial fishery.

Fishery Sampling on the Stikine, Taku and Yukon Rivers

Biological sampling of commercial catches of salmon from the Taku, Stikine and Yukon Rivers was undertaken in 1980. Student samplers examined a total of 2,812 fish on the Stikine River and 2,744 on the Taku River for length, weight, sex, maturity and age. A smaller number was examined from the Yukon River catch. In addition, log-book programs were implemented on these three rivers to provide information on catch per unit of effort. This information will help provide a biological basis for managing the fisheries in future years.

Contact: Robin Harrison,
Senior Management Biologist.
Resource Services Branch.

South Coast

The South Coast Division includes all of Vancouver Island, and the mainland approximately from Cape Caution to Howe Sound. There are four district offices, located at Victoria, Nanaimo, Port Alberni and Campbell River.

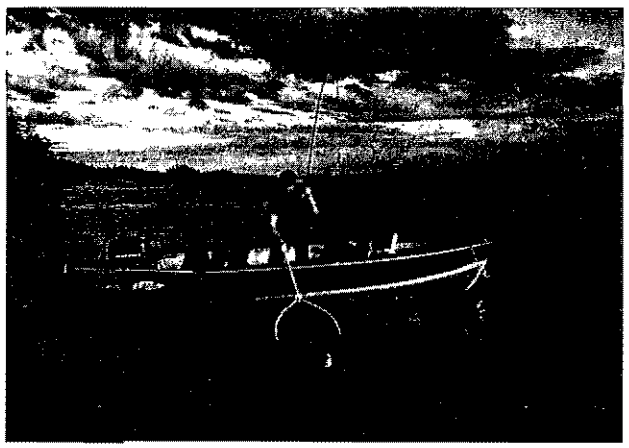
Commercial Fisheries

1980 started off very slowly, with a fishermen's strike during the roe herring fishery which lasted the entire roe season. Only the co-operatives participated, catching 20,000 metric tons, less than one half of the normal harvest in the South Coast area.

Spawn deposition was down in most areas but this is due in part to more refined methods of measuring and estimating spawn deposition. Diver teams were used extensively in 1980, and the accuracy of estimating spawn deposition was greatly improved over years past when herring rakes were the only method

used to obtain the lengths and widths of spawn depositions.

The salmon fishery for net gear was better than had been predicted in the 1980 salmon expectations. The West Coast of Vancouver Island saw good sockeye and chinook fisheries in Area 23 (Barkley Sound), and chum fisheries in Area 22-26 for the first time in many years.



Sport fishermen at Copper Bluffs.

Johnstone Strait again saw a higher than normal diversion of Fraser River sockeye, which improved the predicted sockeye catches significantly. The pink catch was also above predictions, with a stronger than expected return to the Knight Inlet portion of Area 12. The fall chum fishery was very short and had to be curtailed when the strength of Fraser River chum didn't materialize.

San Juan, because of the above normal diversion of sockeye down Johnstone Strait, again had significantly reduced sockeye catches.

The troll fishery in general was very poor; many fishermen are facing financial ruin because of poor catches of chinook and coho.

Spawning was generally felt to be relatively good in most areas, with good spawns of chum and pink reported. This good news was short-lived when floods in early December all but decimated a large portion of the south coast area salmon streams. It will be three to four years before the impacts of these floods are fully realized.

The geoduck fishery continued on the increase in 1980, and concerns that the annual harvest quotas were initially set too high to permit a sustainable yield fishery were confirmed. This will mean a gradual reduction of the initial 1.8 million kilogram quota over a period of years to reach the 0.9 million kilogram sustainable yield quota.

There is a general concern with many of the shellfish species, i.e. sea urchins, sea cucumber, scallops that only small commercial fisheries may be able to be developed under careful control. For many shellfish species, the management data is very limited or in some cases nonexistent. Caution will be exercised to ensure that more "boom-bust" fisheries do not develop, but rather well-regulated, sustainable yield fisheries.

Sport Fishing

The recreational salmon fishery continues to be on the increase, particularly in the Gulf of Georgia. A large creel census survey was undertaken this year to establish the magnitude of effort and catch. This study will provide much needed data to help manage this fishery and to ensure survival of wild chinook and coho stocks.

Indian Food Fishery

The various food fisheries went very well in the South Coast this year and co-operation appears to be improving on both sides. Surplus stocks from enhancement facilities were again used to supply those Bands whose local rivers will not provide sufficient salmon for their food needs. Using surplus hatchery stocks for food fish has permitted

a reduction of subsistence fishing for wild chinook and coho stocks, until such time as enhancement can substantially increase their present numbers.

Habitat Protection

Habitat problems were again a major focus in the South Coast area during 1980. Fishery officers are now spending almost 50 percent of their time on habitat related matters. With continued urbanization and industrialization, the battle to save salmonid habitat has become extremely complex, and the net result is a loss in many areas.

There were some major habitat prosecutions in 1980, with several others scheduled for trial in 1981. The courts appear to be realizing the value of habitat to fish, and this is being reflected in the significant penalties being levied.

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

Nanaimo District

The geographical area being administered from the Nanaimo headquarters office includes 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 on the mainland side from Toba Inlet to Howe Sound. There are six subdistrict offices located at Comox, Qualicum Beach, Nanaimo, Duncan, Madeira Park (Pender Harbour), and Powell River. The major fishing activities in this District include shellfish, salmonids, herring and groundfish harvested by commercial, recreational and native fishermen.

Commercial Salmon Fishing

The 1980 commercial fishery in the Strait of Georgia saw an improvement of catch for the net fisheries--176,701 pieces compared to 18,830 pieces in 1979. The commercial troll fishery was very poor, with a 1980 catch of 298,919 pieces compared to 416,347 in 1979. The poor catch of coho salmon contributed mainly to this catch decline. There was a total of 51.2 gillnet fishing days in 1980 and 8 fishing days for seines. The net fisheries were again concentrated in the Sabine Channel area of Area 16 (Pender Harbour). A terminal chum salmon fishery was conducted at the Big Qualicum River (Area 14) where approximately 86,000 surplus chum were harvested. A total of 3,522 personal commercial fishing licences were

Table 13

NANAIMO DISTRICT

1980 Commercial Salmon Catch

Species	Gillnet	Seine	Troll	Total
Sockeye	5,607	79,881	1,729	87,217
Coho	236	2,714	101,882	104,832
Pink	2	275	443	720
Chum	33,564	52,822	76	86,462
Chinook	354	1,246	194,789	196,389
Total	39,763	136,938	298,919	475,620

sold in 1980, down slightly from the 3,705 sold in 1979.

Sport Fishing

Sport salmon fishing in 1980 was again good, although the cool weather probably resulted in less effort, particularly during the peak season, May through September. DPA Consultants, under contract to the Department, initiated an extensive creel survey to get a better statistical idea of the magnitude of the recreational fishery in the Strait of Georgia. This study will be completed in July 1981, and the information collected will be used to assist in the management of the recreational fishery in the Strait of Georgia.

The nonresident licence sales were down slightly in 1980 $142,125 from $152,405 in 1979. This decline was probably again due in part to the particularly poor summer weather conditions in 1980.

The recreational harvest of shellfish continues to be on the increase with those areas with road access being extensively harvested.

Stream inspections are part of the fishery officer's job.

Indian Food Fishing

The native food fishery in 1980 was very successful, with a total of 65,279 pieces of salmon taken, of which 45,631 came from surplus fish at the Big Qualicum facility. These surplus fish were distributed to the nineteen Indian bands in the South Vancouver Island District. A total of 334 native food fish licences, including licences for harvest of shellfish, were issued in the District in 1980.

Salmon Escapement

The salmon escapements in 1980 generally exceeded those of the brood years. Unfortunately, floods in December appear to have caused dramatic losses of spawn.

Table 14

NANAIMO DISTRICT

1980 Salmon Escapements *

Species	1980	Brood Year	
Sockeye	3,066	(1976)	6,000
Coho	151,007	(1977)	142,900
Pink	16,805	(1978)	3,500
Chum	547,630	(1976)	287,200
Chinook	17,975	(1976)	12,700

* Escapement figures include those to enhancement facilities.

Herring Fishing

The 1980 food and bait fishery this year experienced a multitude of problems; far too many vessels participated and many tried to catch as much fish as possible, even though there was a 25-ton load limit per vessel. Plant capacity was exceeded and the 18-hour processing time limit was waived in order

to ensure that all fish would be processed. The 1980 fishery was concentrated in Upper Stuart Channel. In the initial 27-minute opening, a total of 3,629 t were taken. The following week, an additional 1,724 t were taken for a total of 5,353 t. Plans for the 1981 food fishery will have to include serious measures to reduce the number of vessels participating in each opening and to spread out the fishery over a longer period.

Table 15

NANAIMO DISTRICT

1980 Commercial Herring Catch (t)

Herring	Seine	Trawl	Gillnet
Food & Bait	5352.4	--	--
Roe	172.4	--	3,408.0

Table 16

NANAIMO DISTRICT

1980 Herring Spawn Deposition

(standard square metres x 1000)

Area	1980	1979
14	4,809.88	12,870.8
15	206.83	3,641.3
16	10.40	--
17	1,823.54	514.1
18	97.64	62.3
Total	6,948.29	17,088.5

The 1980 roe herring fishery was a bit of a disappointment; only 3,399 t were taken by gillnet and 172 t by seine. The fishery was concentrated on the northeasterly shore of Denman Island. Vessels not on strike quickly exceeded their packing capacity and the fishery was closed to prevent fish from being wasted. The long delays in unloading fish from packers precluded fisheries in the French Creek and Qualicum areas. The Northwest Bay area fishery was very poor; few stocks spawned in this area in 1980.

The herring spawn deposition in 1980 was good in most areas with improvements in Areas 16, 17, 18. Again, the major spawning occurred around Denman Island/Hornby Island in Area 14. The more refined diver surveys carried out in 1980 tend to be far more accurate than the traditional method of utilizing a herring rake to determine the width of the spawn and walking the beach to determine the length. The acoustic surveys conducted before and during the 1980 roe fishery estimated more tonnage than that found during the entire 1979 roe fishery.

New Fisheries

The four new fisheries; geoduck, squid, plankton and sea urchin mentioned in the 1979 annual report have now become very established fisheries. The geoduck fishery has now been officially licenced with a "G" tab and will be a limited entry fishery. Because of the extremely low recruitment in this fishery, the catch quotas will have to be reduced from 1.8 million to 0.9 million kilograms in the south coast. The slow recruitment in the sea urchin fishery has necessitated the setting of quotas in Statistical Areas 13-20 to prevent overharvesting.

Enforcement

The number of charges laid was down in 1980 as the emphasis shifted to habitat enforcement matters. This resulted in two major habitat prosecutions and several more charges are still awaiting trial.

Canadian Forest Products at Port Mellon was fined a total of $120,000 for permitting the deposit of a deleterious substance in the Rainy River. More charges have been laid against the same company including charges being laid by the provincial Waste Management Branch under the Pollution Control Act.

The second major habitat prosecution was against Construction Aggregates for permitting the deposit of silt into a salmonid stream. They were fined $25,000. Charges have now been laid against MacMillan Bloedel Limited, Harmac Division, Nanaimo for two spills last summer. These will be brought to trial early in 1981. The total charges laid in 1980 was 116, down considerably from the 239 charges laid in 1979.

Habitat

The major focus in the Nanaimo District in 1980 was toward habitat. This took up the largest portion of each officer's time and prosecutions were initiated in many areas.

Table 17

NANAIMO DISTRICT

1980 Habitat Protection Referrals

Type	Number
Water Licences	126
Timber Sales	183
Navigable Waters Protection Act	34
Land Use	199
Subdivision Applications	19
Ocean Dumping	10
Highways Applications	20
Pollution Control Permits	59
Total	650

The Cowichan Estuary Task Force Report has been released and plans are now underway to implement its recommendations. This will see a dramatic decline in the amount of logs boomed in the estuary, which will be reclaimed for fish habitat.

The habitat workload continues to increase. The decentralized habitat division staff arriving in Nanaimo in 1981 should be of major assistance to the fishery field staff.

Salmonid Enhancement Program (SEP)

The community advisor for SEP in the District has been extremely busy this past year with a multitude of projects underway. His help and expertise has been warmly received by all groups, and restocking of many barren coho streams is underway. The community development projects on the Nanaimo River, Cowichan River, at Sechelt and on the Sliammon River continue to be a big success and have created some employment in each of their respective areas.

Apex Bio-Resources again had a contract in 1980 to take chinook eggs from the Chemainus and Cowichan Rivers to attempt to rebuild the Chemainus chinook stocks.

Contact: Jack Broome,
A/District Supervisor,
Nanaimo.

Port Alberni District

The Port Alberni District Office supervises fisheries activities for the west coast of Vancouver Island with offices in Port Alberni, Tofino, Tahsis and Port Hardy.

Commercial Salmon Fishing

During the 1980 net fishery season, a good sockeye salmon net fishery took

Table 18

PORT ALBERNI DISTRICT

1980 Commercial Salmon Catch

Species	Gillnet	Seine	Troll	Total
Sockeye	268,099	418,422	21,531	708,052
Coho	3,441	166	1,677,244	1,680,851
Pink	500	0	177,550	178,050
Chum	198,078	661,429	20,499	880,006
Chinook	30,418	3,652	466,412	500,482
Total	500,536	1,083,669	2,363,236	3,947,441

place in Area 23, (Barkley Sound), followed by a chinook salmon gillnet fishery in the waters of Alberni Inlet during late August - early September with a chum salmon net fishery in Areas 22 to 26 inclusive in October.

Sport Fishing

There were no changes in either catch or effort during the year. Again, 90 percent of the effort took place in Area 23, Barkley Sound - Alberni Inlet.

Table 19

PORT ALBERNI DISTRICT

1980 Sport Fish Catch*

Species	Catch
Coho	7,014
Chinook	12,776

*estimate, tidal only

Indian Food Fishery

Effort has remained relatively stable over the previous year with a slight increase in sockeye catch in Area 23 and a slight increase in the chinook catch, again in Area 23, on stocks identified as surplus to the Robertson Creek hatchery requirements.

Fishery officers and foresters inspect a logging site.

Table 20

PORT ALBERNI DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	20,565
Coho	1,628
Pink	1,020
Chum	7,991
Chinook	7,390

Table 21

PORT ALBERNI DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	349,850	(1976)	173,472
		(1975)	209,217
Coho	53,583	(1977)	110,690
Pink	109,470	(1978)	96,000
Chum	562,716	(1977)	350,021
		(1976)	360,315
Chinook	36,500	(1977)	29,044
		(1976)	17,610
		(1975)	20,494

Herring Fishing

Herring stocks were weak in most areas of the west coast of Vancouver Island. In some areas, had there not been a strike of roe herring fishermen in early 1980, there were not enough herring to open a fishery anyway. In other areas, an opening was possible, but there was some doubt initially as to the industry's packing capacity. When assured by industry of sufficient packing capacity to ensure a good quality product, roe herring fisheries were opened in Clayoquot Sound, Esperanza Inlet and Winter Harbour. However, the catch was the lowest on record since the roe herring fishery opened in 1972.

Table 22

PORT ALBERNI DISTRICT

1980 Commercial Herring Catch* (t)

Seine	Gillnet	Total
2,400	3,650	6,050

* all roe herring

Spawn deposition was about average in the District as a whole, but since there was not much of a fishery, this indicates that stock recruitment is low.

Table 23

PORT ALBERNI DISTRICT

1980 Herring Spawn Deposition

(standard square metres x 1000)

Area	1980	1979
23	500.1	832.4
24	1,291.8	1,120.1
25	317.3	2,530.5
26	no data	no data
27	2,256.1	893.5
Total	4,365.3	5,376.5

Habitat

Habitat protection programs continue to be a high priority function in this District. The most important concerns are foreshore developments in or near estuaries, logging road construction and logging programs in general in watershed areas. Actual figures for habitat protection referrals are not available, but they number in the hun-

dreds. Estimates of referrals by type are: 200 for water licences, 300 for foreshore uses, 300 for timber harvesting developments, 50 under the Navigable Waters Protection Act, 200 for land use applications, 200 for pollution/obstruction, 20 for mariculture and 20 for native community development projects associated with the Salmonid Enhancement Program.

Contact: Don McCulloch,
District Supervisor.

Campbell River District

This District supervises the largest multiple use area in Pacific Region, with over 103,600 square kilometres from Campbell River to Cape Scott, with subdistrict offices at Port Hardy and Alert Bay. With a total of 127 salmon streams, extensive logging, mining, and larger commercial and sport fisheries, the successful management of the District has become increasingly complex.

Commercial Salmon Fishing

The 1980 catch of 2.7 million was down from last year's catch of 3.6 million. Although down in numbers, the total landed value would likely be equal to or exceed the landed value of $40-50 million recorded last year. In 1980, the District recorded a landing of 700,000 chum compared to the previous year of only 100,000, which increases the overall value.

The commercial salmon fishery in this District concentrated mainly on sockeye and chum returning to the Fraser River. Again this year, migration of Fraser River sockeye through Johnstone Strait was well above average, providing a catch of 900,000 for the Johnstone Strait fishery. Since 1980 was an off year for Fraser River pink, the catch of 900,000 was entirely District stock. Of the total catch, approximately 50 percent were Knight Inlet fish, which had an above average return. There were no complete closures of the Johnstone Strait fishery during the salmon season, although fishing was reduced to one day per week during the latter part of the season.

Sport Fishing

Interest and effort in the recreational fishery continues to expand. The catch of coho and chinook salmon increased by over 100 percent from 1979. The new highway to Port Hardy increased the number of boat-days in

Table 24

CAMPBELL RIVER DISTRICT

1980 Commercial Salmon Catch

Species	Gillnet	Seine	Troll	Total
Sockeye	73,206	820,517	5,049	898,772
Coho	28,725	109,949	164,696	303,370
Pink	173,876	660,619	50,492	884,987
Chum	124,519	550,102	5,258	679,879
Chinook	2,840	21,083	76,755	100,678
Steelhead	348	497	73	918
Total	403,514	2,162,767	302,323	2,868,604

the area by 1,000 percent--21,715 in 1980 compared to only 2,100 in 1979. Sport fishermen continue to improve their ability to catch pink salmon, with a total of 19,500 taken, 90 percent in Blackfish Sound. Total effort for the salmon sport catch in 1980 was 131,752 boat-days, up over 100 percent from last year.

The recreational fishery for groundfish, shellfish, etc. continues to expand as remote areas become more accessible.

Table 25

CAMPBELL RIVER DISTRICT

1980 Sport Fish Catch*

Species	Catch
Sockeye	195
Coho	174,637
Pink	19,000
Chum	74
Chinook	44,732

*preliminary estimates

Table 26

CAMPBELL RIVER DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	30,418
Coho	1,623
Pink	5,315
Chum	16,755
Chinook	710

Table 27

CAMPBELL RIVER DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	40,626	(1976)	56,975
Coho	53,997	(1977)	111,139
Pink	1,629,516	(1978)	1,034,725
Chum	285,775	(1976,77)	362,875
Chinook	6,933	(1975,76)	23,725

Indian Food Fishing

The 1980 Indian food fishery increased by over 100 percent from previous years. A total of 164 permits were issued to take food fish by commercial gear.

Salmon Escapements

Escapements to the District were generally poor, with the exception of pink salmon. The escapement of chinook showed a dramatic decline to an all-time low of only 6,933 pieces. With increased exploitation by the commercial and sport fisheries, the chinook salmon appear to be an endangered species unless some drastic action is taken to restrict exploitation and gear efficiency.

The Quinsam River hatchery continues to be the major source for providing coho and chinook for the commercial and sport fisheries. Escapement of wild chinook to the Campbell River are down to a few hundred.

Herring Fishing

The 1980-81 food and bait herring fishery conducted in November and December was very minor, with four seines taking a total of only 90 t. In addition, 400-500 metric tons were taken from local stock to provide commercial and sport bait. There was no herring roe fishery in the District in 1980; with the present stocks, it is not possible.

The 1980 spawning in Area 12 showed a large increase over 1979, but it is still well below the 1.254 million square metres recorded in the early 1970s. Area 13 recorded a dramatic decline in 1980 even with only a minor fishery on local stocks.

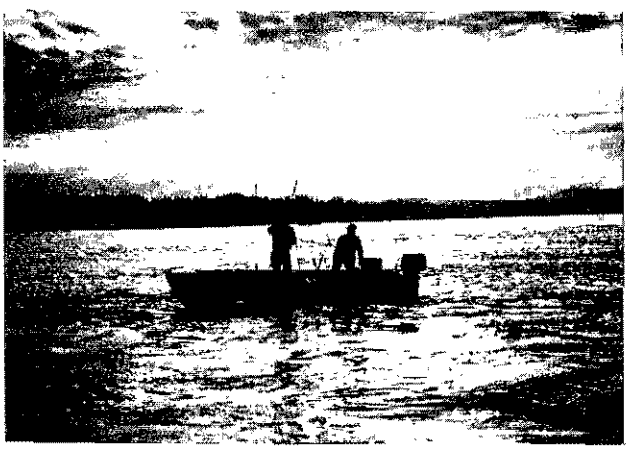
Table 28

CAMPBELL RIVER DISTRICT

1980 Herring Spawn Deposition

(standard square metres x 1000)

Area	1980	1979
11	30.9	18.7
12	330.5	60.0
13	65.8	188.0



Sport fishing at Frenchman Pool.

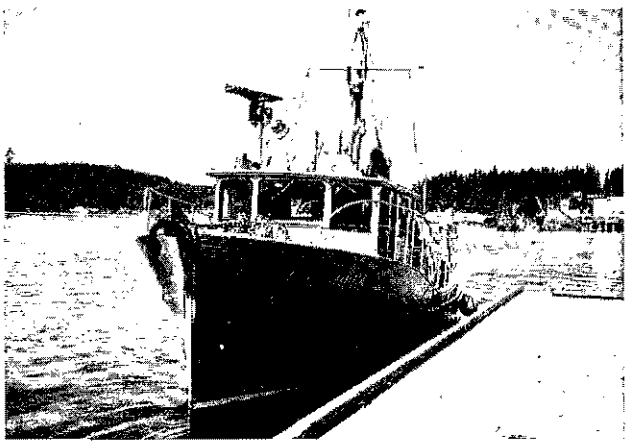
Other Fisheries

Other fisheries include prawns, clams, crabs, geoduck and groundfish. The trend has not changed; there is continued pressure on all fisheries. Total area closures were required for conservation of prawn and groundfish.

It is estimated that catch in 1980 is equal to that of 1979. Approximately 5,443 kg of abalone were landed in Area 12 in 1980. This catch will likely increase in 1981 as new areas are located.

Enforcement

There were 70 prosecutions in 1980, about average for the District. This breaks down to 35 commercial, 25 sport fishing and 10 habitat violations.



FPV Seal Rock.

Habitat

Habitat protection continues to grow in complexity. In 1980, 550 referrals for input to other government agencies were processed. These included timber sales, foreshore leases, gravel removal, pesticide applications, municipal development, ocean dumping and pollution control.

Habitat degradation continues to be the number one threat to the salmonid resource. There are over 40 major logging camps within the District. In 1980, approximately 300-400 hand logging timber sale permits were issued.

Urban and industrial development is continuing at a tremendous rate at Port Hardy and Port McNeill. There are still a number of major habitat problems in the District that have not been

resolved: Quinsam coal development in the Quinsam River watershed, the Western mine, Buttle Lake zinc and copper levels (which have already reached an unacceptable level), landfill of an additional 5.66 ha of Duncan Bay as a waste disposal site, dry land log sorts in the Campbell and Salmon River estuaries, and major marina development in the Nimpkish River estuary. District staff are now spending over 50 percent of their time and effort on habitat protection.

There were increased public relations activities in 1980. Fishery officers spent a considerable amount of time on community projects and talking to schools about SEP.

Fishery officer investigates a potential pollution problem.

Salmonid Enhancement

The Nimpkish Indian Band salmonid enhancement project continued in 1980. Their success has improved over last year. It would now appear that of 3 million sockeye eggs, 90 percent will survive to fry stage with a 60 percent survival for chum eggs.

Several public involvement projects were carried out in 1980, with good success reported from the Quadra Island and Kelsey Bay projects.

Contact: Norm Lemmen,
District Supervisor.

Victoria District

The Victoria District Office oversees operations in the Victoria, Saanich and Sooke areas, and is responsible for the management of the commercial, sport and Indian food fisheries in Statistical Areas 19 and 20 (Victoria and Sooke). Offices are located in Victoria and Sooke.

A major function in this highly urbanized area is public information and education. In addition to making presentations to schools, sport fish groups and the public, staff provide support to the area's many public involvement projects of the Salmonid Enhancement Program.

One of the major highlights during the report period was a tremendous return of chum salmon to all of the local streams, and in particular to Goldstream and Sooke. The escapement to these two systems was the largest in many years.

Two prosecutions in 1980 stand out as a major breakthrough with the courts in Victoria. Both involved sport fishing, one for overpossession of abalone where a $3,000 fine was handed out, and the other was for sale of sport-caught salmon, in which a $2,500 fine was imposed.

The December flood in 1980 was devastating to chum stocks with up to 70 percent total loss.

Commercial Salmon Fishery

A greater than average diversion of sockeye through Johnstone Strait (rather than Juan de Fuca), for the second straight year provided a short sockeye season and below average catches in Area 20. There were only 17 fishing days in 1980 for seines and gillnets, both fishing 12-hour split times on those days.

There were 1,901 personal commercial licences issued in the District in 1980 for a total sale of $9,505.

Table 29

VICTORIA DISTRICT

1980 Commercial Salmon Catch

Species	Gillnet	Seine	Troll	Total
Sockeye	41,074	71,249	100	112,423
Coho	36,162	114,989	1,790	152,941
Pink	64	19	2	85
Chum	42,498	11,171	683	54,352
Chinook	1,651	895	383	2,929
Total	121,449	198,323	2,958	322,730

Sport Fishing

The 1980 sport fish catch in the Victoria-Sooke waters was well below the 1979 catch, and specifically the chinook catch was approximately 50 percent less than 1979. This can only be attributed to very low chinook salmon returns to all rivers.

Total sport effort in 1980 in the District was 63,000 boat-days for a 1.03 catch per boat-day. Catches will be finalized when DPA Consultants Ltd. file their report in 1981.

Table 30

VICTORIA DISTRICT

1980 Sport Fish Catch*

Species	Catch
Sockeye	75
Coho	17,747
Pink	20
Chum	250
Chinook	46,531

*preliminary

Indian Food Fishing

There were 24 Indian food fish licences issued in the District in 1980. A total of 1,100 chum were taken by gaff from the Goldstream River and 500 chum were harvested with a beach seine in Sooke Harbour to be distributed among the Sooke and Becher Bay Indians. Local fishery officers assisted in the netting operation.

A total of 1,000 coho were taken by net and distributed to the Pachena Band of Port San Juan. Once again, local Victoria and Sooke bands received fish from the Big Qualicum River, as 5,947 coho, 400 chum and 800 chinook were distributed.

Table 31

VICTORIA DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Coho	1,000
Chum	1,600

Salmon Escapements

Coho and chum salmon showed a marked increase over the brood year, however, chinook salmon escapements still remain low compared to historic levels.

Record floods in the month of December devastated many of the local streams, with tremendous losses to chum salmon and, to a lesser extent, coho salmon. Estimates as high as 70 percent spawn loss on some streams were recorded.

Table 32

VICTORIA DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	201	(1976)	8
Coho	7,699	(1977)	2,058
Pink	300	(1978)	--
Chum	56,105	(1976)	11,475
Chinook	602	(1976)	350
Steelhead	17		--

Other Fisheries

As the 1980 commercial salmon fishery was one of the poorest in recent history, the non-salmon species received tremendous pressure throughout the year. A commercial prawn fishery took place in Saanich Inlet in Area 19 for the first time and biologists' studies determined the population to be second to none on the B.C. coast. Ten metric tons were harvested prior to the November closure. Also, three metric tons of shrimp were harvested by traps in Sooke Basin. One hundred and twenty-one (121) metric tons of crabs were taken by traps in the District in 1980. The clam total, all of which comes from the Sooke waters by hand digging only, reached 27 metric tons. Geoduck and sea urchins both reached a new high with 89 and 19 metric tons harvested respectively, and two metric tons of abalone were taken in Area 20. Sea cucumbers and octopus received late season pressure by divers after the other dive species were closed.

Enforcement

Enforcement of the various regulations has high priority in the District. Prosecutions were related to the Area 20 (Blue Line) fishery, the heavy sport fishery and infringement of the international boundary by American gillnetters. The number of prosecutions resulting from the latter decreased from the previous report period. The selling of sport-caught fish has been identified as the number one priority for sport fish enforcement. During the report period, three individuals or groups were apprehended selling salmon and abalone. The provincial court judges have taken a tough stance, handing down heavy monetary penalties.

Habitat

Much of the officers' time was spent reviewing marina expansions and development, ocean dumping and dredging, sewage outfalls and storm drain construction due to increased urbanization. Two of the smaller local Victoria streams received a great amount of attention through technical planning committees, meetings and on-site inspections. Developments of a linear park(parkland on either side of a stream), a major shopping plaza and an industrial park all adjacent to one stream necessitated a great deal of time and effort on behalf of the local officers.

Many oil spills of a small nature were attended to in the District during 1980. The chain of communication with industry and the public appears to be getting better, as the Department was alerted immediately in most cases.

Raw sewage outfalls remain a major political issue in the Greater Victoria area. Most of the beaches have been closed to shellfish harvesting due to sewage contamination. Apparently, the costs for treatment plants are so prohibitive that the idea has been shelved from year to year. Again, local officers are getting involved in these political decisions through interviews with the media and at various meetings.

TABLE 33

VICTORIA DISTRICT

1980 Habitat Protection Referrals

Type	Number
Water Licences	46
Timber Sales	3
Navigable Waters Protection Act	16
Land Use Applications	37
Urban Development	25
Ocean Dumping & Dredging	10
Total	137

Salmonid Enhancement

There was a definite increase and stepped-up effort on all systems in salmon enhancement during 1980. In Port Renfrew, approximately 700,000 coho fry were released from the Four-Mile Creek as well as 50,000 chinook fry. In the fall of 1980, 500,000 coho eggs, 173,000 chinook eggs, 24,000 chum eggs, 9,000 sockeye eggs and 3,000 pink eggs were planted in boxes at this site.

The Jordan River Corrections Camp once again supplied a labor force to conduct stream clearance work and fry feeding on various streams.

The Sooke Conservation Society, under direction from this Department, released 34,500 coho fry from 45,000 eggs incubated in 1979. The fry were fed throughout the year. In the fall, 60,500 coho eggs were taken for the boxes on De Mamiel Creek. In Mary Vine Creek 170,000 fry were released into various Sooke streams and 213,000 coho eggs and 70,000 chinook eggs transplanted from Nitinat were incubated in 1980. In Matheson Creek, 100 coho adults returned from a fry transplant in 1978.

The Amalgamated Conservation Society was involved throughout the year at Goldstream. In the spring 20,500 fry were released in the fall and 44,000 coho eggs were collected for the incubation box. Shawnigan Creek has now built a small coho run from Goldstream fry with 33 adults returning in 1980. Also in 1980, 32,000 eggs were put in two boxes.

Contact: Larry Duke,
District Supervisor.

Outdoor Education in salmonid enhancement on the Goldstream River.

Management Biology

The management biology staff assists in the management of a variety of fisheries by conducting test fishing, providing stock abundance estimates and age, timing, and other life history information.

Contact: Dave Schutz,
Senior Management Biologist,
Nanaimo.

West Coast Vancouver Island Chum Test Fishery

This test fishery, designed to monitor for abundance, age and migration patterns, involved 5 gillnets (in Areas 21-27) and 3 seines (in Areas 23-26). Gillnets tested for 5 weeks, and seines for a total of 10 days. Testing started on September 12 and ended October 24.

No harvestable surplus chum were expected, but the test fishery confirmed early visual indications that the returns were much stronger than expected. Openings on the West Coast yielded 858,000 chum, 203,000 to gillnets and 655,000 to seines.

Contact: Steve Heizer,
Management Biologist.

Strait of Georgia Test Fishery

To determine terminal chum salmon stock strength and assess potentials for commercial fisheries, two seine vessels were chartered for test fishing in the Strait of Georgia during late October and November.

The assessment area was the lower east coast of Vancouver Island, specifically those stocks returning to the Puntledge, Big and Little Qualicum, Nanaimo and Cowichan Rivers.

As well as abundance determinations, Peterson disc tags were applied in limited numbers to define stock migration patterns and timing. A gillnet and seine terminal fishery was conducted to harvest available chum returning to the Big Qualicum facility.

Contact: Al Gould,
Management Biologist.

Johnstone Strait Test Fishery

The Johnstone Strait test fishery program was again carried out during September - October to assess returning chum salmon. The program is designed to determine in-season chum stock strength, timing and composition.

Two seine vessels were chartered to conduct the program this year. The boats were based out of Alert Bay and Campbell River to assess chum stocks in Upper and Lower Johnstone Strait respectively.

Contact: Al Gould,
Management Biologist.

Marine Species

This section manages marine invertebrate fisheries including licencing changes, regulations and policy development. In 1980 there were south coast fisheries for abalone, geoduck clams, horse clams, intertidal clam species, mussels, scallops, octopus, squid, sea urchins, sea cucumbers, goose barnacles, crabs, shrimp, prawns, and euphausiids.

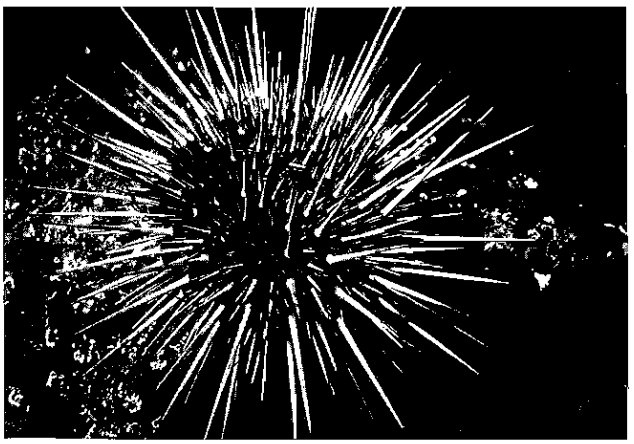
Several mariculture licences were issued to culture species including mussels, abalone, scallops, and marine plants. A fisheries mariculture policy is being developed.

In addition to the fin fish landings discussed elsewhere, there were minor catches of anchovy and perch.

This section was also involved in the interdepartmental Marine Plant Working Group, chaired by the provin-

cial Marine Resources Branch. The group is involved in studies in support of kelp culture and a kelp harvesting and processing industry.

Contact: Rick Harbo,
Management Biologist.



Red sea urchins are harvested from below tide range to about the 15-18 m depth. The main sea urchin fisheries occur in the lower Georgia Strait and Gulf Islands.

Pre-Fishery Herring Seine Charters

This program provides fishery managers with estimates of stock tonnage and biological data required to manage the roe fishery. In 1980, eight commercial seine boats were chartered to carry out test seine sets and provide samples of all fish in potential commercial fishing areas. Samples are also obtained from areas where no commercial fisheries are permitted.

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

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

A bag of geoducks, filled by a diver, is brought up by a commercial geoduck fisherman.

Herring Port Sampling and Laboratory Program

This program aims at providing essential stock status information to herring fishery managers in order to provide for the safe exploitation of B.C. herring stocks.

Herring samples are collected from all major B.C. fishery grounds and at the points of landing. These samples are processed at the herring laboratory and such biological data as age, length, weight and gonad development are determined for individual fish in the sample.

Age/length compositions are determined for the major fishing areas and this information assists researchers in

forecasting herring stock surpluses that will be available during the following year. On an in-season basis, samples taken during the food and bait fishery provide fishery managers with biological data that will aid in planning management strategies for the forthcoming roe fishery.

This program also provides other governmental agencies with samples for special studies that may be conducted, such as fat analysis and stock identification. In all, approximately 39,000 individual fish samples were processed in the laboratory during the 1979-80 season.

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 all spawn depositions occurring 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 general public.

Spawn maps and spawn summary tables are collected from district offices and sent to the Pacific Biological Station in Nanaimo for analysis and to develop the herring population model. Preliminary 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, gives an indication of escapement to the spawning areas. This report also shows any shift in spawning habits of the herring, which can be crucial in the management of subsequent fisheries.

Contact: Dennis Chalmers,
Herring Biologist.

North Coast

This area encompasses Areas 1 to 10 inclusive of the Queen Charlotte Islands and extends inland to the interior of the province to cover the entire Skeena and Nass River watersheds.

Commercial Fishing

The first major fishery of the year was the roe herring fishery which saw 7,252 t taken in the north, 3,869 t by seine and 3,383 t by gillnet. The majority of the catch was taken in Skincuttle and Kitkatla Inlets. Returns to the Central Coast were again low and allowed for a small gillnet fishery only.

This fishery was overlapped by the spawn-on-kelp operations which saw 28 licence holders harvest 171 t of product. Twenty-three of the licence holders operate in the North Coast. Poor handling methods were thought to have contributed to herring mortalities observed in some of the operations.

The spawn-on-kelp operations were followed by the start of the abalone season in which a 4,536 kg quota was imposed on each licence holder and this season extended from April 15 to November 31. This combined vessel quota represented a 113,398 kg reduction from that imposed in 1979.

The salmon season, as usual, had its share of surprises. Just when the Skeena sockeye run should have peaked, it leveled off, and only about 50 percent of the expected total stock returned, while the pink run attained only two-thirds of expectations.

Rivers Inlet sockeye stocks returned

in such poor numbers that for the first time on record there was no fishery permitted on these stocks in this area. One of the saving graces in the North and Central Coast and Queen Charlotte Islands was the strong return of chum salmon which resulted in a total catch of 1.6 million pieces, the highest catch since 1973. Chinook salmon stocks continue to follow their alarming trend towards extinction. This has resulted in more stringent conservation measures being proposed for 1981.

This season, 2,894,260 kg of Alaskan salmon were processed at five fish plants on the north coast.

Groundfish landings continue to increase in the north with 16,400 t landed, an increase of 2,000 t over 1979. This year, quotas for rock sole and Pacific ocean perch were reached during the season. Halibut landings declined in 1980 to 1,200 t from 1,700 t in 1979. This was coupled with more than a 50 percent cut in price per kilogram to the fisherman.

The fishing year ended with a successful food and bait herring fishery which resulted in a 2,000 t catch from Area 5 and just over 500 t taken from Area 1. The market is strongest for food herring over 20 cm. The dragger fleet demonstrates an ability to target on larger fish than the seine fleet, which appears to take much more variable-sized herring.

Major Habitat Issues

The granting of permits to allow the Amax molybdenum mine to dump 12,000 t of mine tailings per day into Alice Arm, and the initial construction stage of Ocelot Industries Ltd. methanol plant at Kitimat have produced some habitat concerns.

A significant increase in truck traffic hauling asbestos and fuel oil between Cassiar and Stewart has created concerns about vehicle accidents which could easily pollute streams along the highway. The shipping of asbestos through the port of Stewart and the reopening of a large mine in the area has renewed concerns about the estuary.

Logging activities have increased in all parts of the north coast.

The development of the Consolidated Cinola mine near the Yakoun River on the Queen Charlotte Islands has raised concern over possible environmental impact in this area.

Indian Food Fishery

On the Skeena system and in other North Coast areas, some of the band councils have accepted the responsibility of distributing food fishing licences. This licence is a legal permit to fish salmon for food in nontidal waters and is issued by the Department. There were no serious poaching problems encountered this season, however, one group initially refused to obey restrictions on fishing time which the Department introduced late in the season for conservation purposes.

Other Points of Interest

Severe flooding in December 1980 caused very serious damage to several major spawning systems in the Central Coast area. Probably the most seriously affected was the Bella Coola system.

Contact: Tom Perry,
A/Area Manager,
North Coast Division,
Prince Rupert.

Kitimat District

The Central Coast District (Kitimat) is comprised of Butedale in the north, Bella Coola and Rivers and Smith Inlets in the south, altogether some 77,000 square kilometres containing 240 salmon producing streams.

Table 34

KITIMAT DISTRICT

1980 Commercial Salmon Catch

Area	Sockeye	Coho	Pink	Chum	Chinook	Total
6	56,215	63,166	2,480,000	192,308	7,500	2,799,189
7	52,501	37,602	391,188	391,000	8,338	880,629
8	132,422	22,599	829,411	283,059	13,000	1,280,491
9	234	1,157	4,612	7,843	368	14,214
10	1,186	1,521	481	15,867	503	19,558
Total	242,558	126,045	3,705,692	890,077	29,709	4,994,081

In order to manage the fisheries of the Central Coast, there is a permanent staff of fishery officers and patrol vessels stationed at Rivers Inlet-Smith Inlet, Bella Bella, Bella Coola and at Kitimat.

Commercial Salmon Fishing

Area 9 (Rivers Inlet) was closed to all salmon net fishing for the conservation of sockeye until August 11, when the sounding program at the head of Rivers Inlet and a gillnet test fishery indicated that approximately 288,000 sockeye were in the sanctuary area. Rivers Inlet was opened on August 12 for gillnets only for two days. Only 234 sockeye were caught in Area 9, the lowest in recorded history. Area 10 (Smith Inlet) was managed on a similar basis, with a total closure to all nets until the sockeye escapement was past the Docee River counting fence. When it became apparent that the target of 120,000 sockeye required for the spawning grounds would be realized, Area 10 was opened to gillnets on July 28 on a 2-day per week basis for the next four weeks when the area closed for the balance of the season. Only 1,186 sockeye were caught in Area 10 during 1980.

In Area 8 (Bella Coola) the field-hailed figures showed a total sockeye catch of 132,400, which is 13,000 less than the 10-year average.

Sockeye catches in Area 7 (Bella Bella) and Area 6 (Butedale) are dependent strictly on the strength of passing stocks. In Area 7, a total hailed catch of 53,000 pieces was taken, similar to the 1978 catch and up considerably over the 10-year average of 40,000. In Area 6, a total catch of 56,300 pieces was realized, which is identical to the 10-year average catch of 56,000.

Coho catches for the Central Coast were comparable to the catch of 1979, with 126,000 landed by the net fleet (no troll figures available) compared to 124,000 in 1979. In Area 6, 63,000 pieces were landed, which is comparable to the 10-year average of 61,000; in Area 7, 37,600 pieces were harvested compared to the 10-year average of 58,000; while in Area 8, 22,599 coho were taken by the net fleet, which is less than half of the 10-year average of 48,000.

Coho are not managed on the Central Coast on an individual species basis, but are usually harvested incidental to other species. This has resulted in overfishing the coho stocks. The present coho populations are strong enough to rehabilitate to historic levels if they were specifically managed. The first step is to move the opening date of the offshore troll fishery ahead to July 1 or July 15 instead of June 15, and to curtail the 7-day per week effort by trollers outside the "surf line". In an effort to assist the declining coho stocks, in most of the Central Coast the trollers have been limited to the same times and places as the net fleet. However, it is the offshore troll fleet which has contributed most to the decline of this species, apart from environmental damage in some areas.

The pink catch in Area 6 was 2,408,000, which is up considerably over the 5 even-year average of 1,850,000. In Area 7, the pink catch by the net fleet was poorer than anticipated at 390,000.

The Area 8 pink catch was hailed at 830,000 which is not quite half of the 10 even-year average of 1,900,000. Part of the reason for the low catch was the reduction of seine depth from no depth restrictions to 5 3/4" strips, or 28 fathoms, whichever is less.

The chum return to the Central Coast was one bright spot on the horizon. In Area 6, 192,000 were taken, which is up 41,000 over the 10-year average of 153,000. In Area 7, the net catch of chum was 391,000, which is up considerably over the 1976 catch of 153,000.

The Bella Coola subdistrict had a chum catch of 283,000 which is almost 100,000 above the 10-year average of 194,000, but once again this excellent catch was not reflected with a high escapement on the spawning grounds, despite only 1 and 2-day fishing weeks.

Chinook salmon throughout the District continue to decline as a result of environmental damage and overexploitation by all user groups.

In Area 6, the only exploitation of this species bound for Butedale subdistrict streams is by the offshore troll fleet, as all of these fish are in the sanctuary area prior to opening the net fishery. In 1980 only 7,500 chinook were landed by the seine and gillnet fleets, compared to the 10-year average of 15,000.

In Area 8, approximately 13,000 chinook were landed by the net fleet, which is 7,000 less than the 10-year average of 20,000.

Sport Fishing

Approximately 90 percent of the sport fishing effort in the Central Coast is directed at coho and chinook.

In Area 6, a large sport fishing flotilla operated in Douglas Channel south to Bishop Bay just north of the old Canadian Fishing Company cannery at Butedale. It is estimated that in excess of 10,000 chinook were taken in this area in 5,500 boat-days of effort. Catch per boat-day was estimated at two fish. In addition, 800 coho and some 350 pink were also taken.

Table 35

KITIMAT DISTRICT

1980 Sport Fish Catch*

Species	Catch
Coho	5,127
Pink	3,350
Chinook	15,646

*tidal and nontidal estimated catches

Most of the nontidal sport fishery in the Butedale subdistrict is in the Kitimat River, where for the first time, the entire river was closed to chinook fishing except for two two-week periods during June and July, when chinook fishing was allowed below the confluence of Goose Creek. During this period, the chinook catch was estimated at 170 pieces, compared to 250 in 1979. In addition, an estimated 350 coho were taken.

The sport fishing effort in Area 7 has shown a marked increase in the past two years. Most of the effort is directed towards Lama Pass-Gullchuck-Seaforth Channel and Return Channel. Charter boats are concentrating their effort around St. John Harbour, where they fish for the large chinook that frequent this area.

In Area 8, a very concentrated sport fishery in Hakai Passage commences in mid-July and goes well into September, only to be curtailed by inclement weather. The sport fishing effort in Hakai Pass was down from 6,193 boat-days in 1979 to 4,364 this year, possibly due to rising fuel costs.

The effort in Area 9 increased slightly this year, with 2,033 permits being issued compared to 1,862 in 1979. Although the effort increased, the overall catch was only 726 chinook, compared to 1,488 in 1979. This decline in catch can be partially attributed to enlarging the closed area to include a well-known chinook holding area. The largest chinook taken was 35.1 kg (77.5 lbs.), the average weight was 12.3 kg (27.2 lbs.), and 59 percent of the sport fishermen were residents of the United States.

The sport fishing in Area 10 is limited to the Wyclees Lagoon area at the mouth of the Docee River where local fishermen concentrate on the very large chinook headed for this system.

Indian Food Fishing

Indian food fishing for the Central Coast area is managed according to the needs of the different bands in the area.

In Area 6 the Kitamaat Band is permitted to fish in the tidal waters of Douglas Channel four days per week from 6:00 p.m. Thursday to 6:00 p.m. Monday throughout the year. In addition they are given permits upon request for areas outside Douglas Channel.

Table 36

KITIMAT DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	13,058
Coho	3,499
Pink	4,642
Chum	5,999
Chinook	1,217
Steelhead	732

The Klemtu and Hartley Bay Bands are issued band permits for the use of commercial gillnets and seines outside of commercial boundaries and under direct supervision of the Department of Fisheries and Oceans. In addition, the Hartley Bay people are issued personal permits for the Quall River for coho on a per day basis.

In Area 7, permits are issued on a day-to-day basis primarily for sockeye in the early summer, but sockeye returns to local streams have been reduced to such a low level that the food fish demand for this species had to be supplemented by catches from Areas 8 and 9, where 2,000 pieces were taken this season. A late fall chum fishery is usually conducted behind commercial boundaries.

In Area 8, permits are issued on an individual basis for four days per week to drift the Bella Coola River from Thorsen Creek to Bella Coola. A very modest food fishery is conducted on the Atnarko River by the Chilcotin Indians at Smokehouse, a traditional subsistence fishing location.

In Rivers Inlet, four permits were issued for local Owikeno Band members, primarily for sockeye in the Wannock River.

Eulachons totalling 130 t were caught in native food fisheries in Areas 6 and 8.

Salmon Escapements

Salmon escapements within the Central Coast varied from poor to excellent. The worst showing was the poor return of sockeye to Rivers Inlet, with only 288,000 on the spawning grounds, where 500,000-750,000 is the desired target. The desired number of spawners for Smith Inlet was reached, with 130,000 counted past the Docee River counting fence.

In Bella Coola subdistrict, only 35,300 sockeye were observed on the spawning grounds, compared to 99,000 in 1975 and 67,000 in 1976, while the 10-year average is 69,000.

Sockeye escapement to streams in the Bella Bella subdistrict was only 4,000, compared to 6,000 in 1975 and 5,300 in 1976. This was not sufficient to satisfy native food fish demands.

In the Butedale subdistrict, sockeye escapements were estimated to be just slightly below the 10-year average of 22,500.

The coho escapements to all subdistricts were far below optimum and can only be classified as dismal.

In Rivers Inlet, the pink salmon escapement was fair, with approximately 142,000 on the spawning grounds compared to 110,000 in 1978, but well below the 5 even-year average of 200,000. In Smith Inlet, only 2,500 pink spawners were recorded.

The Bella Coola subdistrict had a good escapement of pink, estimated at 1,128,000. Although this is comparable to the 10-year average of 1,450,000, it is only half of the brood year escapement in 1978. However, the optimum escapement seems to be about one million; that level produces better results than years when heavy spawning occurs.

Table 37

KITIMAT DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	477,300	(1976)	499,000
Coho	70,800	(1973)	90,200
Pink	2,232,500	(1978)	3,575,000
Chum	398,000	(1976)	307,400
Chinook	17,800	(1976)	37,000

Pink escapements to Bella Bella were estimated at 221,000 compared to 287,000 in the brood year, and 130,000 short of the escapement goal.

The escapement of pink to the Butedale subdistrict was estimated at 740,000, slightly below the 5 even-year cycle average of 814,000 and the brood year escapement of 859,000.

In Rivers and Smith Inlets, the chum escapements were 23,000 and 57,000 respectively, compared to 6,900 for the 1976 brood year in Rivers and only 8,500 for Smith Inlet in 1976.

Table 38

KITIMAT DISTRICT

1980 Commercial Herring Catch (t)

Herring	Seine	Trawl	Gillnet
Food }	--	--	--
Bait }	345*	--	--
Roe	--	--	660.5

* includes catch by one dragger

Table 39

KITIMAT DISTRICT

1980 Herring Bait Permits

Area	Permits	Catch (tonnes)
6	5	11
7	13	50
8	6	5
9 & 10	-	-
Total	24	66

The Bella Coola subdistrict recorded 125,000 chum on the spawning grounds, which is identical to the 1976 escapement and the 10-year average. However, an adequate escapement should be about 350,000.

Approximately 110,000 chum escaped to the spawning grounds in the Bella Bella subdistrict, which is comparable to the brood year when 100,000 were recorded. However, 75 percent of this total return was in four rivers.

Escapement of chum to the Butedale subdistrict amounted to 83,000, far below the 1970-79 average of 151,000, but up slightly over the brood year escapement of only 67,000. If the spawning grounds were adequately seeded, the escapement should be at least 350,000.

Chinook escapements to Rivers and Smith Inlets were estimated at 2,000 and 1,200, up slightly over that estimated for both subdistricts in 1976. The escapement of this species to Bella Coola was only 9,700 compared to the 10-year average of 23,000.

In the Butedale subdistrict, only 4,800 chinook were observed on the spawning grounds, which is less than half of the 10-year average of 11,000 and only 75 percent of the 7,000 counted in 1976.

Herring Fishing

Only one subdistrict, Butedale, had any herring roe fishery or herring food fishing.

The food and bait herring fishery opened on December 2 in the Butedale subdistrict on the west coast of Aristazabal Island where 12 seines took 220 tonnes. The area was then closed for reassessment and re-opened on December 8, where 5 seines and one dragger took a further 125 tonnes for a total catch of 345 tonnes.

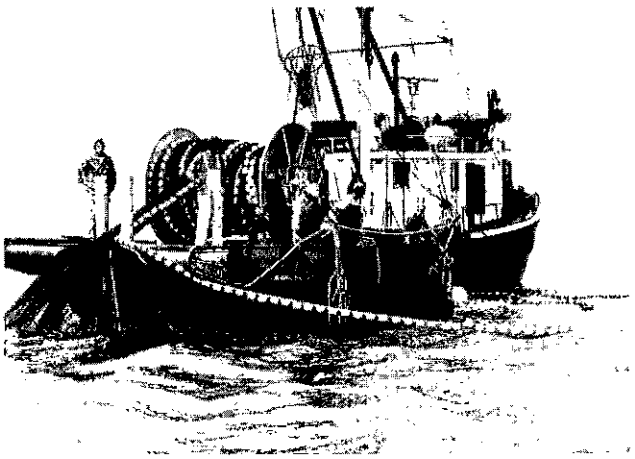
Three roe on kelp permit holders operated in the Central Area during 1980, producing 14 t of product.

Habitat

Habitat protection is the one single activity, next to the management of the salmon and roe herring fisheries, that occupies the most time of field officers.

There are three major logging companies operating in the Kitimat Valley and the Kemano drainage. In addition, there is one "A" frame show in the tidal waters, another operating exclusively on fume killed timber in the Kitimat Valley and two working on Indian Reserve land.

In the Bella Bella area, 50 applications for hand-logging operations were inspected and approved. However,



A seine boat off the B.C. coast hauls in its catch.

Table 40

KITIMAT DISTRICT

1980 Herring Spawn Deposition

(standard square metres x 1000)

Area	1980	1979
6	530.5	206.5
7	878.7	345.8
8	189.0	73.4
9	129.3	36.7
10	74.8	175.3

due to poor market conditions, only 8 actually had any production.

In Area 8 (Bella Coola), there were four active logging companies operating this year, with Crown Zellerbach carrying out logging activity in five major watersheds. Doman Industries and a subcontractor started road construction, camp installation and barge landing facilities on the Kimsquit River at the head of Dean Channel. The anticipated start up in 1980 of T.F.L. 39 by MacMillan Bloedel did not develop as a result of market conditions.

Table 41

KITIMAT DISTRICT

1980 Habitat Protection Referrals

Type	Number
Logging	258
Other	32
Total	290

Crown Zellerbach abandoned the longstanding log dump in the estuary of the Bella Coola River and moved it south 1.6 km to Clayton Falls. The environmental impact to the estuary should be much less as a result.

In Areas 9 and 10, there are six logging companies operating within the subdistrict with one company, Pacific Logging, working in four different watersheds. Two new operations got underway this year, one in Moses Inlet on the Clyak River by Crown Zellerbach and the other in Safety Cove on Calvert Island by White Enterprises.

Industrial Development

The start up of site preparation and foreshore dredging for the Ocelot methanol plant in Kitimat was begun at the end of 1980. The major construction of the plant itself and the gas pipeline to supply raw material (natural gas) will not get underway until 1981.

The Crown-owned pulp mill at Ocean Falls was closed this year. Steps are being taken to set up a low-grade timber sawmill at Ocean Falls sometime in 1981.

Salmonid Enhancement

Site preparation, land clearing, access road construction and placing of fill has gone ahead for the planned construction of the major hatchery on the Kitimat River.

With the assistance of the region's community advisor, the Hartley Bay School established a demonstration incubation box for 50,000 chum and coho eggs taken from Hartley Bay Creek.

The extensive tagging program carried out in 1978 and 1979 in the outside portions of Area 6 was discontinued in 1980.

Also in Area 6 (Butedale), 1,439 chinooks in Kitimat Arm were tagged by Beak Consultants during 1980.

The McLaughlin Bay hatchery, operated as a community development project by the Bella Bella Band, was rebuilt in 1980. During 1980, 500,000 chum eggs were incubated from the Neekis River.

The Atnarko hatchery was disassembled in 1980 because of difficulties related to poor water quality and high operating cost. The odd-year pink stocks for which it was intended rebounded naturally.

The Snootli hatchery, constructed in 1979 primarily for the rehabilitation of summer chum, collected and eyed 2.9 million eggs in 1980.

Floods

Severe flood conditions in December 1980 brought about large-scale damage to spawn depositions in the Butedale subdistrict and the Bella Coola River system.

Hydraulic sampling in the Atnarko River showed 0.6 live eggs to the square foot compared to 28.4 in 1978 and 22.0 in 1976. Similar losses are expected on most of the tributaries of the Bella Coola River.

Contact: Ed Christiansen,
District Supervisor.

Queen Charlotte District

The Queen Charlotte District office oversees fisheries and habitat protection operations on the Queen Charlotte Islands and adjacent waters from the International A-B boundary in Dixon Entrance to Cape St. James at the southern end of the Islands, and east into Hecate Strait. Fishery officers and patrol vessels work out of offices at Sandspit, Masset and Queen Charlotte City.

Commercial Fishing

The Area 1 (Dixon Entrance) salmon fishery targets primarily on passing stocks in the vicinity of Langara Island to Rose Spit. There was a dramatic increase on the troll catch of pink salmon in 1980 due to a large influx of gear to the area and also to a major movement of American pink into Canadian waters. A six week period in July and early August produced over 70,000 troll-caught pink per week.

On the west coast (Area 2W), a small, primarily seine fleet fished passing mixed stocks for seven weeks. Local pink were fished for one week, and local chum for two weeks. The troll fishery, opening February 1 was closed for two weeks in early April due to excessive catches of juvenile coho salmon.

Table 42

QUEEN CHARLOTTE DISTRICT

1980 Commercial Salmon Catch

Species	Gillnet	Seine	Troll	Total
Sockeye	29,638	70,186	4,973	104,797
Coho	23,034	27,378	434,602	485,014
Pink	18,342	162,701	722,211	903,254
Chum	105,767	69,605	10,984	186,356
Chinook	930	16,682	135,698	153,310
Total	177,711	346,552	1,308,468	1,832,731

Strong chum returns to Skidegate Inlet enabled a three week fishery there, plus one week of fishing for chum on the lower end of the east coast.

Sport Fishing

Sport fishing continues to increase on the Charlottes. Inauguration of the B.C. Ferries' Prince Rupert-Queen Charlotte run on a twice-weekly basis in mid-November will undoubtedly result in a rapid rise in sport fishing pressure over the next few years. Catches are estimates only.

Table

QUEEN CHARLOTTE DISTRICT

1980 Sport Fish Catch

Species	1980	1979
Coho	6,086	2,375
Pink	2,460	325
Chinook	911	290
Halibut	947	810
Crab	1,104	--*
Rockfish	1,971	720
Lingcod	959	320

* 1979 crab catch figures not available

Indian Food Fishing

The Skidegate and Masset Bands split sockeye catches fairly evenly from the Copper and Yakoun Rivers respectively. Most of the chum catch was taken by seine from Skidegate Inlet, although some chum were gillnetted from the Awun River near Masset.

Table 44

QUEEN CHARLOTTE DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	10,550
Chum	1,586
Coho	5
Steelhead	106

Escapements

Although 1980 was an on-cycle year for pink, escapements were generally weak on the Charlottes, probably due to heavy flooding in 1978. Returns were good in several systems on the west coast and in the lower portion of the east coast. Chum escapements were fair to good throughout the District except in the north, where chum returns were down dramatically. Returns to Skidegate Inlet were stronger than anticipated, mainly due to a strong return of three-year-old fish. Coho and chinook were also down over the long-term average, and sockeye escapements were about average.

Table 45

QUEEN CHARLOTTE DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	43,137	(1975)	39,600
		(1976)	42,860
Coho	43,211	(1977)	94,210
Pink	758,383	(1978)	904,060
Chum	267,753	(1976)	223,175
		(1975)	270,696
Chinook	600	(1975)	1,500
		(1976)	700

Pallant Creek hatchery on Cumshewa Inlet obtained 3 million chum eggs and 1.1 million pink eggs from Pallant Creek and 385,000 chum and 60,000 pink eggs from Mathers Creek, for a total of 4.5 million eggs. All eggs are to be incubated at the hatchery, which has a capacity of 10 million chum eggs.

Herring Fishing

Commercial herring fishing in the District commenced in mid-February with a small gillnet fishery in Naden Harbour that produced just under 100 metric tons. Later in March, a mixed gillnet and seine fishery in Louscoune Inlet, at the extreme southern end of the Charlottes, produced over 1,000 metric tons of good quality fish, shortly followed by an opening in nearby Skincuttle Inlet on the east coast. Here, 3,000 metric tons were landed but a high percentage of smaller three-year-old herring lead to a reduction in the area quota.

The eleven roe on kelp licence holders, all operating on the east coast, did well this year. A total of 79 metric tons of product was harvested, and some of the spawned fish were sold for fresh bait for the halibut fishery.

Table 46

QUEEN CHARLOTTE DISTRICT

1980 Commercial Herring Catch (t)

Herring	Seine	Trawl	Gillnet	Total
Roe	2,335	--	1,552	3,877
Food	478	--	--	478
Bait	--	--	--	--

Table 47

QUEEN CHARLOTTE DISTRICT

1980 Herring Spawn Deposition

(standard square metres x 1000)

Area	1980	1979
1	38.12	71.24
2E	771.85	241.61
2W	54.32	122.59

Herring spawn deposition in Louscoune Inlet was low compared to previous years, as was the Naden Harbour spawn. On the east coast, excellent

spawn was recorded for Skincuttle Inlet and Juan Perez Sound, while spawnings in Cumshewa and Skidegate Inlet were poor.

Other Fisheries

The 1980 abalone harvest on the lower east coast declined, with only 21 metric tons landed compared to 31.8 metric tons in 1979. Effort appears to be concentrated in the more accessible areas. In addition to regulation closures of Tasu Sound, Rennell Sound, Skidegate Channel, Virago Sound, Masset Inlet, Cumshewa Inlet and Juan Perez Sound; Carpenter Bay and Skincuttle Inlet were closed to commercial abalone harvesting.

A geoduck fishery was initiated in Cumshewa Inlet in the late summer, and by late October a total of 73 metric tons was harvested. All product was flown whole to Vancouver for processing.

One metric ton of mixed humpback shrimp and prawns was produced in Area 2 West. Almost all of these were from Skidegate Channel, and all were sold on the local market.

Although the north coast Area 1 saw little activity for geoducks or abalone, 677,342 kg of crabs and 74,157 kg of razor clams were harvested from the vicinity of North Beach.

Incidental landings of 21,667 kg of halibut were handled through the cold storage plant in Masset, but the majority of halibut and all trawl-caught bottomfish from Area 1 were handled through Prince Rupert or Vancouver processing facilities.

Habitat

The Queen Charlotte District employs a habitat officer who deals exclusively with fish habitat related problems throughout the Queen Charlotte Islands.

Steep slope logging adjacent to fish streams continues to be a major issue in the Queen Charlottes. In the aftermath of Riley Creek, a technical advisory committee was created with a joint federal/provincial operating fund of $1 million to study several potential problem areas of fishery/forestry interaction in the Queen Charlotte Islands. These studies will commence in 1981.

The locally produced management document **Streamside Management Methods for the Queen Charlotte Islands,** has been officially endorsed by the Forest Service. Its provisions for streamside protection are included on all cutting permit documents.

Terrain stability mapping has been initiated or completed on most unstable areas within the 10-year projection for forest operations on the Charlottes. A Fisheries and Oceans/Forest Service study group is refining the stability mapping criteria to increase its applicability to fish habitat protection.

It has been known for some time that the hydrological response of a watershed may be seriously altered by excessively high rates of forest cover removal. The alteration is harmful to fish habitat; however up to now, an acceptable rate of cut has not been agreed upon. The local district Ministry of Forests has now accepted the findings of the joint Fisheries/Forestry study. Forest companies are now required to control the rate of cut in identified watersheds to less than 25 percent of the total drainage area in any 25-year period.

Three major forest companies have skyline and helicopter logging planned for unstable areas. Although the areas are possible high lead logging sites, the companies have made this considerable investment solely due to environmental concerns.

Recent interest in precious metals has caused an explosion in mineral exploration on the Queen Charlottes.

The quality of road construction and responsibility of operators is generally very poor in the mineral exploration phase. Currently, two violations are pending under the Fisheries Act as a result of mineral trenching. In some cases, the Department has been successful in forcing the use of a helicopter for drill transport. Considerable vigilance is required to ensure compliance with the reclamation specifications.

The rapidly expanding Cinola Mine near the Yakoun River is becoming a major environmental issue due to the potential for sedimentation and heavy metal emmissions. The phase II environmental report is under review, and several mitigating measures are under consideration.

Increased population pressures have resulted from mining-forestry expansion and recent public ferry service to the Queen Charlotte Islands. Queen Charlotte City and Port Clements are expanding and redesigning refuse and septic disposal systems. An airport facility is proposed for construction near the environmentally sensitive Delkatla Slough.

The South Moresby Resoures Planning Team has tabled a modified plan for the Windy Bay Ecological Reserve.

Recent losses of hazardous material from deep-sea barges have necessitated special communications with U.S. and Canadian Coast Guard.

Plans for offshore drilling by Chevron Standard are pending since the announced intention to lift the moratorium on offshore drilling.

Contact: Kip Slater,
District Supervisor.

Table 48

QUEEN CHARLOTTE DISTRICT

1980 Habitat Protection Referrals

Type	Number
Water Licences	45
Timber Harvesting	
a. Management and Working Plans	2
b. 5-Year Development Plan Areas	206
c. Cutting Permit Areas	46
d. Private Timber	8
Mineral Development Permits	
a. Exploration	26
b. Reclamation	19
Crown Land Leases	
a. New Applications	31
b. Renewals	12
Ocean Dumping	3
Urban Development	8
Navigable Waters Protection Act	5
Pollution Control Board	18
Highways Development	31
Salmonid Enhancement Proposals	30
Total	490

Prince Rupert District

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

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

Table 49

PRINCE RUPERT DISTRICT

1980 Commercial Salmon Catch

Lower Nass

Species	Gillnet	Seine	Troll	Total
Sockeye	66,768	94,191	409	161,368
Coho	16,246	20,005	37,656	73,907
Pink	134,468	701,782	66,427	902,677
Chum	197,737	96,052	1,635	295,424
Chinook	1,998	8,948	6,275	17,221
Steelhead	1,212	647	32	1,891
Total	418,429	921,625	112,434	1,452,488

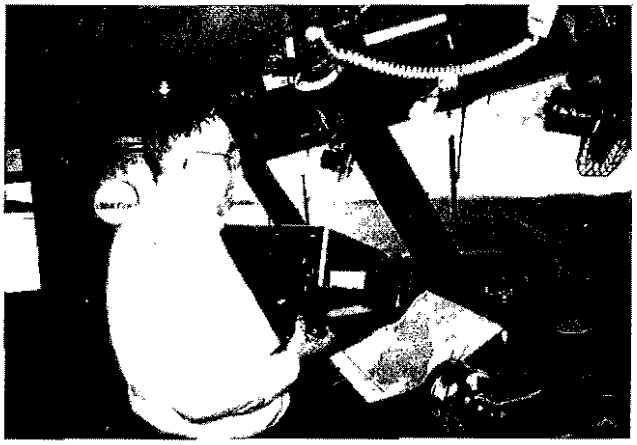
Lower Skeena

Species	Gillnet	Seine	Troll	Total
Sockeye	325,576	5,160	117	330,853
Coho	20,192	1,092	11,831	33,115
Pink	160,147	12,341	10,332	182,820
Chum	66,479	3,103	285	69,867
Chinook	7,019	397	3,382	10,798
Steelhead	3,889	12	8	3,909
Total	583,302	22,105	25,955	631,362

Grenville-Principe

Species	Gillnet	Seine	Troll	Total
Sockeye	22,885	2,332	30	25,247
Coho	12,496	4,004	19,074	35,574
Pink	98,876	343,645	9,262	451,783
Chum	32,281	5,725	93	38,099
Chinook	407	630	9,779	10,816
Steelhead	288	39	2	329
Total	167,233	356,375	38,240	561,848

The headquarters of the District, situated at Prince Rupert, supervises the fisheries activities in the Lower Nass, Skeena River, Grenville-Principe area and the Nass and Skeena watersheds. Interior subdistrict offices are located at Terrace, Nass Camp, Hazelton and Smithers.



FPV KITIMAT II sounding for herring, Kitkatla Inlet.

Commercial Salmon Fishing

The sockeye return to the Skeena in 1980 was only slightly greater than one half the expected return of 2.01 million. Both the age 4 and age 5 components of the stock were weak, the age 4 being the biggest disappointment.

The 1980 pink stock was only two-thirds of the expected return of 1.5 million.

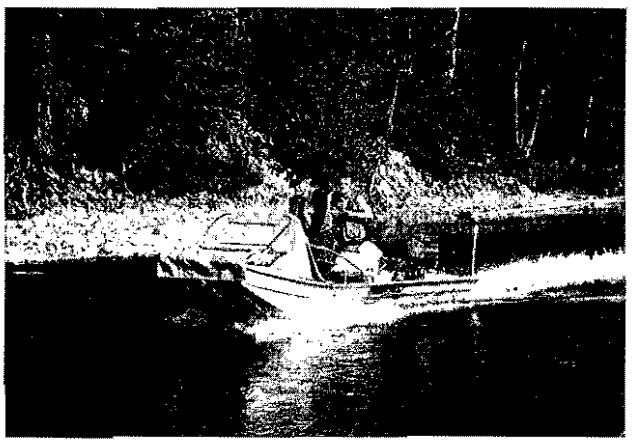
Only 13 net fishing days were allowed in Area 4 (Skeena River) in 1980.

Regular portions of Grenville-Principe opened to salmon fishing during the summer with the exception of Porcher Inlet which opened for 24 hours, catching 50,000 pink. Relatively good catches were received in Ogden Channel during the peak pink salmon return, while catches of sockeye, coho and chum were below average.

The highlight of the commercial salmon fishery in the Lower Nass this year was the excellent chum catch. The chum return was much stronger than anticipated. Field catch information provided an estimated 280,000 chum catch compared to the ten-year average of 161,900. The chum escapement (54,600) was slightly below the ten-year average of 58,600 spawners.

The major disappointment of this salmon net fishery was the poor pink return. The brood year escapement of 400,000 was one of the highest on record, yet the total return of 113,400 spawners and 700,000 catch was well below the ten-year average of 212,700 spawners and 748,900 catch.

Sockeye catches and escapements were both well below average, but the escapement of 160,000 was well up from the brood years. Coho catches and escapements were poor this year. Chinook salmon catches and escapements were also poor, and well below the ten-year average.



Fishery officers patrol the Morice River.

Sport Fishing

The catch throughout the District was down in 1980, despite the increased effort of sport fishermen. Poor returns to the major systems were the major factors in the low success rate. Certain sport fishing restrictions had to be implemented in the interior of the District to conserve spawning stocks.

Indian Food Fishing

There were no major problems encountered during the 1980 food fishery. Band councils throughout the District resumed the responsibility of

Table 50

PRINCE RUPERT DISTRICT

1980 Sport Fish Catch

(preliminary)

Species	Tidal	Nontidal
Coho	1,130	4,275
Pink	335	--
Chum	5	--
Chinook	3,867	3,135
Steelhead	--	9,325*

* Upper Nass catch not available. Of the 9,325 steelhead catch, 5,625 fish caught in the Smithers area were released.

Table 51

PRINCE RUPERT DISTRICT

1980 Indian Food Fish Catch

Species	Catch
Sockeye	160,658
Coho	6,054
Pink	6,241
Chum	2,065
Chinook	10,044
Steelhead	4,220

Table 52

PRINCE RUPERT DISTRICT

1980 Salmon Escapements

Species	1980	Brood Year	
Sockeye	733,000	(1975-76)	743,600
Coho	84,019	(1977)	103,300
Pink	1,130,840	(1978)	1,389,000
Chum	85,236	(1975-77)	99,000
Chinook	40,670	(1975-77)	20,600

issuing food fish licences to resident band members.

Salmon Escapements

With the exception of the Nass River sockeye, escapements of all species of salmon returning to the District were below average.

Herring Fishing

A total of nine roe on kelp licences operated in the District with a quota of 7,257 kg of product for each licence. It is anticipated that the volume measurement method will be reinstituted throughout the coast for the 1981 season because the product is easier to measure, resulting in better quality.

The roe herring fishery for seines at Kitkatla Inlet on the west side of Gurd Island yielded 1,390 tonnes with a roe yield ranging from 9½ percent to 10 percent.

The gillnet fishery in Kitkatla Inlet was restricted to the waters north and east of Gurd Island from Snass Point to Robert Point with 240 gillnets operating for a catch of 1,061 tonnes. The roe yield ranged from 11 3/4 percent to 14 percent.

The 1980 food and bait fishery harvested 1,638 of the 1,814 tonne quota.

Table 53

PRINCE RUPERT DISTRICT

1980 Commercial Herring Catch (t)

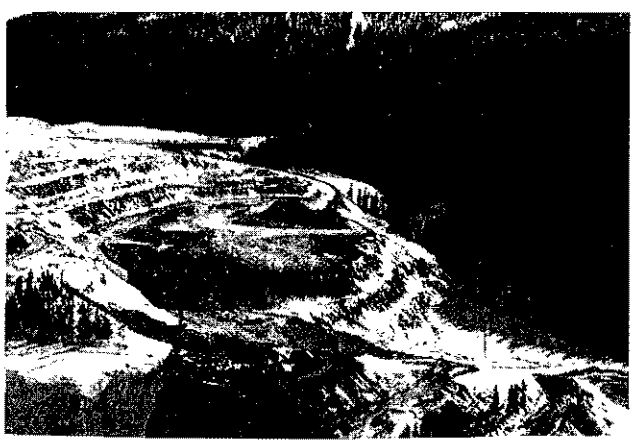
Herring	Seine	Trawl	Gillnet
Food & Bait	783	1,023	--
Roe	1,533	--	1,170

Herring seine test fishing in Kitkatla Inlet.

Habitat

Several new and major developments are underway in the District. The Amax Mine at Alice Arm is proceeding on schedule, with 12,000 tonnes of tailings to be deposited daily in Alice Arm. The Nishga Tribal Council is opposed to this mine, arguing that the mine will have severe impacts on the food chain and their fishing livelihood.

The land is being cleared for the new superport at Ridley Island near Prince Rupert. Road construction between Terrace and Prince Rupert is continuing without incident.



Controversial Amax Mine at Kitsault.

Table 54

PRINCE RUPERT DISTRICT

1980 Herring Spawn Deposition

(standard square metres x 1000)

Area	1980	1979
3	134.7	216.9
4	241.0	657.6
5	731.0	602.3

Mining exploration was on the increase, particularly in the Nass River area. Near Houston, the Equity Silver Mine opened in 1980. The tailings from this mine are deposited in a landfill.

Contact: Gus Jaltema,
District Supervisor.

Management Biology

Rivers Inlet Sockeye Enumeration

This program proivdes in-season information on the size and timing of the sockeye return for the management of the fishery and to ensure that the desired escapement is obtained. Sampling for age analysis of the sockeye was conducted at the mouth of the Inlet throughout the month of July. Overall age of the run was 85 percent five-year-old sockeye.

Also in early July, enumeration by echosounding at the top end of Rivers Inlet indicated a very slow build-up of escapement to the 300,000 level, so Rivers Inlet remained closed to fishing until the main body of sockeye had moved into Owikeno Lake, when a very limited pink fishery commenced. The 1980 return of sockeye was well below expectation and provided a minimum escapement.

The size, age and sex of all sport-caught chinook salmon in Rivers Inlet were recorded as part of the ongoing monitoring of this sport fishery. The number of sport-caught chinook salmon was 723 in 1980, down from 1,488 in 1979. The number of sport fish permits was slightly higher than 1979 but angler success was much lower. This was because of a sport fishing boundary change and below average return of chinooks.

The escapement to the Wannock River (the basic stock providing trophy fish for Rivers Inlet) was estimated at 3,000 to 3,500 chinook.

Smith Inlet Adult Enumeration

The counting fence at the outlet of Long Lake is used to determine in-season escapements and this information is used in the regulation of the Area 10 sockeye fishery. In 1980, 128,000 sockeye were counted through the fence. Five-year-old fish accounted for 80 percent of the total return. The total return was higher than expected and resulted in a very good escapement. A limited sockeye fishery occurred on the tail end of the run, but only 3,000 were caught.

Owikeno Lake Smolt Studies

This program, usually carried out annually, is aimed at determining the number of sockeye smolts produced from the brood year spawners. The spawning grounds are inspected for fry movements and habitat alterations, and the lake is sampled for juvenile sockeye abundance. Fry and smolts are enumerated, and samples are weighed and measured to determine their condition and characteristics.

The 1980 program to determine the index of smolt abundance was cancelled because of a budget cut.

Skeena River Test Fishing

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

For 1980, the test fishery overestimated the actual sockeye escapement by 30 percent and underestimated the pink escapement by 18 percent. Low water levels may have been a contributing factor to these errors.

The accuracy of the test fishing estimates for sockeye and pink salmon are checked against actual escapement counts every year and the predictive equation adjusted for improved accuracy.

The test fishery gives estimates of daily escapement for both pink and sockeye. Escapement estimates from test fishing were well within the accuracy range required for management purposes.

Nass River Test Fishing

The estimation of daily sockeye escapements past the Nass River commercial fishing boundary is a vital tool in maintaining a spawning population level that will ensure a harvestable surplus of these salmon in perpetuity.

Although not as accurate as the Skeena test fishery, the Nass index provides an essential information source upon which much of the Nass sockeye fishery management is based.

In 1980 the Nass test fishery performed extremely well and gave an estimate of escapement that was within 10 percent of the actual.

Meziadin Fishway and Nass Survey

The enumeration of sockeye spawners helps to predict future returns and is also used to make adjustments to the Nass River test fishing estimate.

The Meziadin fishway bypasses a series of shallow falls which impede sockeye migration, and allows for an exact count of the sockeye spawners entering the Meziadin Lake system. Chinook and coho salmon are enumerated as well, however, their counts are not complete as chinook can leap over the falls and the coho run continues long after the counting program is terminated.

Sockeye spawning estimates are made for Bowser Lake using a freshwater age analysis technique. A gillnet survey was carried out in Bowser Lake to obtain scale, length and sex information from the spawning population. The scale analysis data from Bowser Lake, along with that from Meziadin Lake are entered into a computer program along with similar data from the Nass River test fishery. The freshwater circuli counts of sub-3 fish from Bowser and Meziadin are significantly different, so that the proportion of each type in the test fishery, when combined with the known escapement into Meziadin, results in the escapement estimate for Bowser Lake.

Babine River Counting Fence

The Babine River system is the largest sockeye salmon producing watershed on the Skeena River, and has produced over 90 percent of the sockeye run in good years. The counting fence operation is an important management tool for determining adult salmon escapements into the system as well as sockeye smolts leaving the system. The adult program, as well as providing an accurate spawner count, is used to calibrate the Skeena River test fishery. The smolt estimate gives an indication of the success of the lacustrine (lake portion of the life history) stage of a given fry output as well as providing a basis for forecasting future returns.

The downstream count of sockeye smolts provides a basis for estimating the expected adult return from a given brood year. The total downstream estimate is calculated from a mark-recovery program. The sockeye are marked with coloured staple tags, released in Nilkitkwa Lake and recovered at the smolt fence. The sockeye smolt output was 55,210,000 in 1980 from the 1978 brood. Biological samples are collected during the downstream migration and bioassayed for length, weight, age and parasitic infestation. This data provides a measure of the fitness of the migrating stock, useful in forecasting future returns.

A total count of adult salmon entering the Babine River system was carried out betwen July and September 29, 1980. Absolute counts of sockeye and pink spawners are used to help improve the Skeena test fishery estimates and ensure adequate escapement levels are maintained on the Babine/Skeena watershed.

Contact: Don Anderson,
Senior Management Biologist,
Prince Rupert.

Abalone Fishery

The commercial abalone season began on April 15, 1980 and closed on November 30, 1980. In 1980, each licenced abalone vessel was assigned a vessel quota of 4,545 kg (10,000 lbs). The total coast-wide allowable catch was set at 113,630 kg (250,000 lbs), and approximately 109,090 kg (240,000 lbs) were harvested during the fishery. The majority of the catch was taken in the Central Coast area and smaller amounts were harvested in the Queen Charlotte Islands and the North Coast.

Annual log books summarizing the location and harvest effort submitted by the fishermen, in addition to biological surveys conducted by the Pacific Biological Station, are used to estimate the sustained yield.

Annual meetings are held with the licence holders to discuss management plans for the upcoming season and review the previous year's fishery.

Abalone Survey

Abalone beds on the west coast of Banks Island were surveyed during June 1980. Densities were measured and abalone were sampled for sex, shell length and weight. Algal communities with the abalone beds were also described.

Information from this survey will assist the Department in responding to recent claims by local native groups that abalone stocks have been seriously depleted by the commercial fishery.

Spawn on Kelp Fishery

Sexually mature herring are caught, usually by seine, and are released into an enclosure site or pond confined by seine web. Herring spawn on kelp attached to strings, suspended in the pond. Following spawning, the herring are released and the kelp is removed and packed in containers with brine.

In 1980, 28 spawn on kelp licences were issued, each allowing a production of 7.25 t of spawn on kelp. Total production was 170,497 kg (375,095 lbs). Excessive herring mortality occurred in some of the ponds, probably attributable to poor handling techniques.

In 1981, to improve and facilitate management of this fishery, the volume method of measurement will be adopted. Each licence holder will be permitted to produce 11 cubic metres of spawn on kelp and brine which will be measured at the operation or pond site.

Contact: Paul Sprout,
Management Biologist.

Offshore

The Offshore Division develops and implements management strategies within the 200-mile limit, and ensures that both foreign and domestic vessels comply with all regulations. 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.

Canada allows foreign countries to harvest any surplus stocks which Canadian fishermen are unable to harvest. One of the principal functions of the Division, therefore, is to identify surpluses, as well as to identify domestic fisheries where a surplus no longer exists.

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 co-operative fishing arrangements intended to bridge the gap in the transitional stage of ending foreign involvement in British Columbia's 200-mile zone.

Contact: Ed Zyblut,
Division Chief.

Special Programs & Management

This Unit designs, develops, evaluates and implements special programs to optimize the yield in offshore fishery resources. It promotes the efficient commercial use of regional offshore fish resources by conducting analyses and investigations, in addition to working with industry and other agencies. Finally, the Unit is also

responsible for drafting regional policy papers, impact studies and contingency plans in support of international negotiations, and provides regional input to Canada's national policy on foreign fishing within the 200-mile limit.

Contact: Trevor Proverbs,
Supervisor.

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. Some specific responsibilities of the Unit are to:

- compile and assess foreign and domestic catches with a view to implementing closures or other regulatory measures upon attainment of quotas

- prepare licences, permits and fee assessments for foreign vessels engaged in either fishing for a national allocation or engaged in a joint-venture operation with Canadian vessels

- maintain effective communications with other departmental agencies, commercial fishermen, industry representatives and foreign industry or government representatives

- evaluate and recommend changes to existing regulations and agreements pertaining to the offshore fishery.

Contact: Bob Wowchuk,
Supervisor.

Offshore Surveillance & Enforcement

The Surveillance and Enforcement Unit is responsible for monitoring the movements of domestic and foreign fishing vessels, and for enforcing management regulations outside the surfline and inside the 200-mile limit. In order to meet this need, a number of objectives were set:

- 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, every vessel fishing in offshore Canadian waters, more often in sensitive areas.

To meet these objectives, vessels, planes and equipment owned by several government agencies (Department of National Defense, Department of Fisheries and Oceans, Ministry of Transport) were used.

Contact: John Cairns,
Supervisor.

Surveillance Activities

In 1980, 528 sea-days were allotted to the Offshore Surveillance and Enforcement Unit, with the Department of Fisheries and Oceans (DFO) vessels assigned 508 days and Department of National Defense (DND) vessels 20 days. A total of 303 days were used by the end of the year, with DFO using 288 days and DND 15 days.

The three departmental headquarter vessels, the Tanu, Laurier and Howay, logged a total of 56,354 km in 281 days, with 1,096 km and 7 days logged by the FPV Atlin Post. DND vessels travelled a total of 6,408 km.

Offshore fishery officers spent a total of 477 days at sea in 1980, with 323 days aboard offshore patrol vessels, 100 days aboard foreign vessels, 21 days aboard domestic

Table 55

U.S. Catches in the Canadian Zone (metric tons)*

Species	Lower West Coast Vancouver Island	Upper West Coast Vancouver Island	Cape Scott-Queen Charlotte Sound
Rockfish	37	727	658
Incidental Catches			
Pacific Cod	02	30	36
Lingcod	02	39	14
Sole	03	14	11
Others	04	36	10
Total	48	846	729

* preliminary

vessels and 33 days involved with inshore fisheries.

Vessel sightings by surface vessels totalled 2,840, of which 2,739 were Canadian, 19 American, 15 Japanese, 32 Polish, 33 Russian and 2 Greek. These figures include vessels which may have been sighted on more than one occasion.

In addition to surface vessels, DND supplied Tracker aircraft dedicated to fisheries patrols and Argus planes employed in a multitasked role. Trackers flew a total of 497.9 hours in 102 flights and the Argus logged 120.0 hours. Aircraft sightings totalled 550 with a "sighting" being defined as only those vessels in which the name was discernable from the aircraft.

Offshore fishery officers conducted 588 boardings and inspections during the year. Four hundred and seventy-nine (479) Canadian vessels were inspected, 9 American, 30 Soviet, 20 Japanese, 7 Greek and 43 Polish. These figures may, and do, include multiple inspections and thus do not reflect actual vessel numbers operating in the Canadian zone.

There were 96 port entries by foreign fishing vessels into Vancouver during the year, with some ships entering on more than one occasion. Eighty-two (82) Polish vessels and 14 Soviet vessels visited for reasons including crew changes, crew rest and recreation, repairs and stores and bunkers.

During 1980, 17 domestic warnings were issued and 10 domestic charges laid. One American vessel was charged, and 11 American vessels, one Japanese, one Polish and one Greek vessel issued with warnings.

American Groundfish

In March 1979, the Governments of Canada and the United States established the terms and conditions under which American fishermen would be allowed access to Canadian waters to fish groundfish off the B.C. coast.

The total catch was set at 6,500 metric tons over the next two years.

During each of the annual periods ending March 31, 1981, they would be permitted to catch 285 metric tons of groundfish off the lower west coast of Vancouver Island, 885 metric tons from the upper west coast of Vancouver Island and 2,080 metric tons from the Cape Scott-Queen Charlotte Sound area, including a 250 metric ton quota on Pacific ocean perch/yellowmouth rockfish.

Each American vessel was licenced by the Department and notified DFO of entry and exit from the Canadian zone and movement between the three areas.

Fishing effort was directed towards rockfish, and stringent incidental catch limits of other species were enforced by both Canadian and U.S. officials.

By December of 1980, U.S. vessels had caught only 51 percent of their total allocation for 1980-81.

Hake Co-operative Arrangements

Hake co-operative fishing arrangements with foreign nations began in 1978 following the establishment of the 200-mile fishing zone in 1977. In these arrangements, Canadian mid-water trawl vessels deliver their catch to foreign processing ships, which in 1980 included vessels from Poland, the U.S.S.R. and Greece. The fishery was coordinated once again by the Hake Consortium.

The benefits to Canadian fishermen have increased substantially in the 3-year period. In 1978, two Canadian trawlers landed 1,814 t valued at $240,000; in 1979, eight Canadian trawlers landed 4,233 t valued at $504,000; and in 1980, twelve Canadian vessels landed 13,210 t with a landed value of approximately $2 million. Over the past 3 years, the number of Canadian fishermen have increased from 11 to 66, while the number of Canadian vessel fishing days have increased from approximately 70 in 1978 to 700 in 1980.

Table 56

Domestic Trawl Landings
(metric tons)

Species	1979	1980*
English Sole	1,069	1,002
Rock Sole	1,874	1,629
Petrale Sole	202	133
Dover Sole	861	1,056
Rex Sole	203	94
Starry Flounder	296	54
Turbot	1,823	1,153
Other Flatfish	53	40
Pacific Cod	9,500	7,190
Lingcod	1,159	787
Sablefish	276	215
Pacific Ocean Perch	2,819	4,835
Other Rockfish	5,573	3,618
Misc. Species	190	112
Dogfish	1,275	1,480
Pollock	3,384	2,021
Hake	819	720
Total	31,376	26,139

* Interviewed landings only--does not include sales slip data for vessels not interviewed.

The co-operative fishery has had a positive effect on the B.C. fishing industry for a number of reasons. First, the fishery has decreased fishing pressure by a number of the top Canadian trawlers in the traditional groundfish fisheries. These arrangements have also enabled fishermen to improve their technical expertise of fishing for hake, and have provided technical knowledge to the processing sector. This may lead to the development of a new domestic fishery. Finally, this fishery has contributed greatly to the West Coast economy

Table 57

1979 - 1980 Foreign Landings* within B.C.'s 200-Mile Limit

Country	Species	1979 Quota	1979 Catch	1980 Quota	1980 Catch
Poland	Hake	6,700	4,262.7	5,000	4,943
U.S.S.R.	Hake	3,000	--	--	140.6
Japan	Hake	6,000	3,637.3	6,000	816.9
Japan	Sablefish	1,000	982.3	--	--

* Quotas and catches are expressed in metric tons.

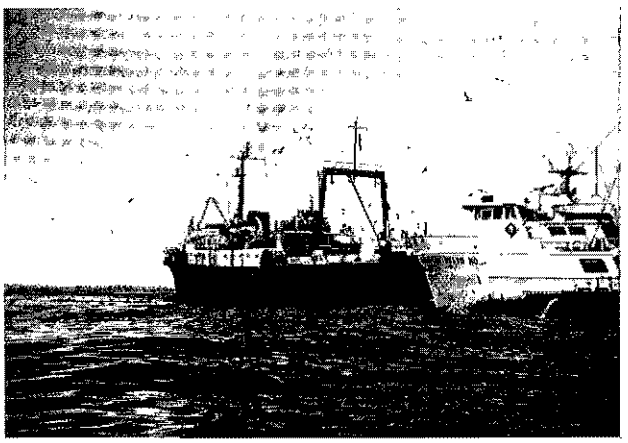
through the purchase of fuel, supplies and ship repairs by foreign countries, with an expected value of $3 million in 1980.

National Hake Fisheries

Poland, Japan and the Soviet Union participated in national hake fisheries in 1980. Poland was allocated 5,000 t and landed 4,943 t, Japan was allocated 6,000 t and landed 817 t. Japan's low catch was due to high incidental catches of other species. The Soviet Union landed 141 t while supplementary fishing in the Co-operative Arrangements noted above. Total foreign access and fishing fees collected in 1980 were $237,000.

Foreign Observer Program

A foreign observer program was implemented for the first time in 1980, covering both the co-operative and national hake fisheries. The purposes of the observer program were to monitor landings, take biological samples and notify the Department of any regulations infractions. Ten observers were hired on a third-party contract, giving complete coverage to the hake fishery. A final report concerned with the hake fishery and the observer program is currently being completed.



A domestic trawler transfers the cod-end to a foreign factory vessel for processing of the fish.

Squid Exploratory Project

A follow-up to the 1979 exploratory joint squid fishery venture between Canada and Japan occurred in August 1980. Information collected included biological data and landing and production calculations. The venture took place off the West Coast of Vancouver Island and the purpose was to determine the abundance of squid and the feasibility of a domestic fishery. One or two more years of assessment is required before the feasibility can be determined. Two Japanese longline vessels landed approximately 132 t. Preliminary findings indicate that it is

possible to gillnet squid offshore, with very little incidental catch of salmon.

The Japanese were allocated 200 t of sablefish, plus 50 t of squid, as payment for the exploratory work. The surplus squid was sold to the Japanese companies for $42,000.

Alaska Halibut Fishery

1980 was the last year that Canadian fishermen were permitted access to the halibut grounds off Alaska. Twenty-seven (27) permits were issued by the U.S. government for Canadian vessels to fish the 544 t (1.2 million pound) quota. Final catch figures showed a 318 t (700,000 pound) overrun, which

Table 58

Pacific Hake Landings* in B.C. Waters (Area 3C) 1977 - 1980 (metric tons)

Country	1977 Quota	1977 Catch	1978 Quota	1978 Catch	1979 Quota	1979 Catch	1980 Quota	1980 Catch
National Fishery:								
U.S.S.R.	7,500	552.0	6,500	700.0	3,000	--	Supplement	140.6
Poland	7,500	2,708.4	6,500	586.0	6,700	4,262.7	5,000	4,943.0
Japan	5,000	1,931.3	5,000	3,364.0	6,000	3,637.3	6,000	816.9
Total	20,000	5,191.7	18,000	4,650.0	15,700	7,900.0	11,000+	5,900.5
Co-operative Fishery:								
U.S.S.R.	--	--	--	--	6,000	1,131.0	8,000	4,884.2
Poland	--	--	5,000	1,814.0	3,000	3,102.0	5,000	4,795.7
Greece	--	--	--	--	--	--	6,000	3,529.7
Total	--	--	5,000	1,814.0	9,000	4,233.0	19,000	13,209.6
Domestic Fishery:								
Domestic	--	--	--	--	open	92.8	8,000	46.3
GRAND TOTAL - All Fisheries:								
U.S.S.R.	7,500	552.0	6,500	700.0	9,000	1,131.0	8,000	5,024.8
Poland	7,500	2,708.4	11,500	2,400.0	9,700	7,364.7	10,000	9,738.7
Japan	5,000	1,931.3	5,000	3,364.0	6,000	3,637.3	6,000	816.9
Greece	--	--	--	--	--	--	6,000	3,529.7
Domestic	--	--	--	--	open	92.8	8,000	46.3
Total	20,000	5,191.7	23,000	6,464.	24,700+	12,225.8	38,000	19,156.4

* includes some pollock incidental catch

was attributed to better than average fishing in International Pacific Halibut Commission regulatory Area 3 in 1980.

Halibut Relocation Program

Implementation of the Alaska Halibut Relocation Plan was completed in 1980. Sixteen Canadian halibut longline vessels surrendered their halibut licences to the Department in return for assistance in relocating to other fisheries. Participation was considerably less than had been projected, and as a consequence, effort in the Canadian halibut fishery in 1981 is expected to increase.

Trawl Fleet Licencing

The licence transfer moratorium is still in effect. Regulations will be put forward to make the trawl licencing policy similar to other fisheries policies.

Sablefish Fishery

Regulations implementing licence limitation in the sablefish fishery were gazetted on November 17, 1980. Commencing January 1, 1981, all vessels fishing for sablefish with either trap or longline gear will require a "K" tab.

1980 was also the first year in which there was no foreign allocation of sablefish. In fact, the coastwide quota of 3,500 t was caught by December 1, and the fishery was closed for the remainder of the year.

Economic Groundfish Surveys

a) Groundfish Exports

A survey of groundfish exports was carried out in 1980 to provide the Department with background economic data concerning groundfish markets.

b) Processing Industry Survey

Major groundfish processors were surveyed in 1980 to determine industry's opinion of the groundfish management plan from a marketing perspective. A final report is near completion.

c) Trawl Cost Survey

A survey was initiated in 1980 to gather economic data on the financial state of the B.C. trawl fleet.

Cod-end coming on the deck of a foreign factory vessel.

1980 Tuna Fishery

On August 22, 1980, an interim Albacore Tuna Agreement between Canada and the United States was reached which allowed albacore fishermen from each country to fish in the other country's 200-mile zone. The embargo imposed against Canadian tuna products by the U.S. in 1979 was also lifted as part of the Agreement.

As a result of the Agreement, 800 American tuna vessels requested permission to enter the Canadian zone, but only 107 of these actually entered and fished for albacore. This, coupled with a Canadian fleet of approximately the same size, caught far below the 1979 catch. The domestic catch decreased from 289 t in 1979 to 212 t in 1980. At this time, the total northeastern Pacific albacore catch has not yet been calculated.

Operations Center

The principal responsibility of the Operations Centre is to gather information relating to commercial and recreational fishing activity off the Pacific Coast of Canada, and ensure the orderly and timely distribution of this information to Department personnel, 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 Centre 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 the remainder of the year.

Contact: Suzanne Benoit,
Supervisor.

Inspection & Special Services

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

During 1980, the Inspection Division maintained surveillance of the various fish plants, which continued to grow in number during the year to a total of 145. This is nine more than the previous year which, in spite of the current downturn of the market, reflects the long-term optimism associated with the future of the industry.

A program of plant 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 unless they are accompanied by certificates attesting to satisfactory

quality. As Canada is now the largest exporter of fish and fish products, maintaining high quality standards is of increasing importance, especially as markets become more competitive.

Again in 1980, the Inspection Division played an important role in applying the special quality provisions, put in place in 1977, for the export of frozen sockeye and pink salmon. The regulations were adopted in order to avoid a disruption of our traditional canned salmon markets. In 1980 the Inspection Division certified $103.8 million worth of fresh or frozen products (representing 21.3 million kilograms of product) and $37.5 million worth of canned salmon (representing 24% of total landings). Canada retained a significant part of the market in the face of severe competition.

In summary, Inspection staff were busy throughout the year, monitoring the construction and operational requirements of fish processing plants, vessels and other facilities to ensure that only good quality fish and fish products are offered for sale in Canada and abroad.

In 1980, a national Fish Quality Improvement Program was initiated. The main components of the Fish Quality Improvement Program are:

- Vessel certification: As this is already a condition of licencing, activities will be restricted to monitoring and upgrading operating practices to ensure quality preservation.
- Dockside grading: The dockside grading of fish will be encouraged in recognition of those fishermen who take extra care to land top quality fish. This will probably be achieved by the certification of qualified graders.
- Unloading, dockside handling and transportation to plants: Regulations will be amended to prohibit the use of equipment that damages fish. Approved water supplies will be required at all unloading sites. The handling and transportation of fish will be monitored closely to ensure quality preservation.
- Improved quality control in processing plants: Guidelines are being developed with the Fisheries Council of Canada for good manufacturing practices and quality control in the plants.
- Final product grade standards: Standards are being developed with industry for groundfish fillets, frozen herring fillets, cured herring products and for B.C. salmon.

The Department will be publishing a series of advisory articles covering recommended practices for handling fish in specific fisheries.

Contact: Charles Campbell,
Acting 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 international organizations or companies.

The number and size of plant facilities continued to expand throughout the year. Currently, there are 117 registered companies operating a total of 145 plant facilities (compared to 109 registered companies and 134 plants in 1979).

Extensive surveys of salmon canneries were carried out with Health Protection Branch officials and inspection engineers during the summer of 1980. A total of 12 canning facilities were surveyed for compliance with fish inspection regulations as well as good manufacturing practices required by the Health Protection Branch.

Contact: Ian Devlin,
Senior Inspection Engineer.

Shellfish Coordinator

The Shellfish Coordinator's main responsibility is the administration of the Sanitary and Paralytic Shellfish Poisoning (PSP) Control and Monitoring Program, which was set up to protect the public against the marketing of unsafe shellfish products.

1980 was a record year for PSP outbreaks in the Johnstone and Georgia Straits. Between May and November, there were four major PSP outbreaks in these waters. The PSP outbreak on May 17 in Gilford Island (Area 12) resulted in the death of one man, and nine people required medical treatment. On June 13, the entire B.C. coast was closed for the harvesting of bivalve molluscs. As toxic levels declined to safe levels, selected areas were reopened to commercial harvesting under permit. On November 1, Areas 14 and 17 to 20 were reopened to the recreational harvesting of bivalve molluscs.

Water quality and sanitary surveys were conducted by the Environmental Protection Service on Bowen Island; Denman-Hornby Islands; Okeover, Lancelot and Theodosia Inlets; Gillies Bay; Desolation Sound; Quadra, Cortez and Redonda Islands. As a result of the Desolation Sound survey, seasonal closures will be instituted in boat anchorage locations throughout this general area.

Because of the potential health hazard associated with the consumption of bivalve shellfish, a much higher level of surveillance is required in relation to its volume and value.

Two new oyster shucking plants opened in 1980. A total of 64 facilities were registered for the processing of bivalve molluscs. There were 9 plants involved in the processing of 2.6 million kg of geoducks and 4 plants were involved in the mariculture of oysters and/or mussels.

Contact: Sing Liem,
Shellfish Coordinator.

Boat Inspection

The Vessel Fish Hold Inspection Program which was created to ensure sanitary conditions for holding fish aboard fishing boats has been most successful. The program provides regular inspection of over 7,500 commercially licenced fishing vessels. The rate of failure to meet the standards is now less than 1 percent, a dramatic improvement over the initial years. The requirements are set out in the Pacific fishery registration and licencing regulations and compliance is a condition of vessel licencing.

There is presently only one vessel registered to process fish at sea, but there are several vessels and barges either in the planning stages or being constructed with the intention of providing processing capacity at sea.

The surveys of freezer vessel construction and product quality are continuing. The number of vessels with freezer capacity now appears to be around 400. There is a continuing concern among customers, processors, exporters and fishermen about the quality of fish from freezer vessels. There seems to be a desire common to all of these groups to work together to solve quality problems associated with freezer vessels.

The Boat Inspection Program has been well received, evidenced by the excellent cooperation from the fishermen.

Contact: Klaus Schallie,
Vessel Inspection Coordinator.

Product Inspection

The Product Inspection Division examines domestic and imported fresh and frozen fish and canned fish products to ensure that organoleptic quality (appearance, smell, taste, feel, etc.), container integrity, additives and labelling comply with the requirements of the fish inspection, the food and drug, and the consumer packaging and labelling regulations.

Product rejections are usually related to improper labelling, safety or quality. Products may be refused entry because thay are decomposed or contain substances or bacteria injurious to public health. Canned products may also be turned away because of problems associated with underprocessing or can integrity.

During the 1980 calendar year, the Product Inspection Division inspected a total of 8,594 lots of fresh, frozen and canned fish products, an increase of 24 percent over the previous year.

The Canned Fish Inspection Laboratory examined 37,463 samples from 1,271 shipments of imported products representing 9,272,749 kg of product. The laboratory rejected 43 shipments totalling 232,886 kg of product. There were also 2,438 lots of domestic canned salmon inspected representing 1,051,052 equivalent 48-pound cases valued at approximately $146.3 million.

The Fresh and Frozen Inspection Laboratory examined 4,565 shipments of imported product having a total weight of 14,879,750 kg. The laboratory rejected 125 shipments representing 162,779 kg of product.

There were 2,729 export certificates issued for frozen products of all species covering 21,338,225 kg. The quantity of frozen salmon certified for export was 13,882,433 kg, or 65 percent of the total for all species of frozen fish certified.

Twenty-four percent of the canned salmon pack was also certified for export to foreign markets. The 233 certificates covered 269,132 equivalent 48-pound cases valued at approximately $37.4 million.

Contact: Wilf Gushue,
Product Inspection Supervisor.

Bacteriological Laboratory

The Bacteriological Laboratory is responsible for almost all microbiological inspections on fishery products imported through Pacific Region (2,855 of 2,859 analyses). These imports accounted for 57 percent of all microbiological analyses carried out by this Section in 1980.

Since the laboratory is already working at capacity, any unusual problems encountered have required a reassignment of priorities. Serious contamination problems at two domestic shellfish processing plants were primarily responsible for a 56 percent increase in domestic sample analysis over 1979. There was a corresponding drop in import inspections, by 6.5 percent. However, microbiological inspections in total were up by 17.8 percent over 1979.

Bacteriological results were periodically reviewed, problem products and plants identified, and products with a good record placed on preferred sampling (only one of every 5 lots to be inspected).

Salmonella testing increased by 43.7 percent, and 12 isolations were made in the year, a new annual high.

Thirty-eight (38) import lots were rejected for bacteriological reasons.

Contact: Nick Neufeld,
Senior Microbiologist.

Chemical Laboratory

During 1980 the Chemistry Section inspected 2,463 lots of fish consisting of 3,160 sample units requiring a total of 4,911 different analyses. Both the number of lots and samples increased over the past year.

Paralytic shellfish poison analyses nearly doubled due to four major outbreaks this year, the first of which occurred in May and resulted in one death. The mussel sampling program was also expanded to some extent this year. The histamine surveillance program on canned tuna also required double the number of analyses due to a large increase in number of imports from Southeast Asia, a region from which tuna has a history of high histamine levels. (High levels of histamine in fish such as tuna may cause a sensitivity reaction in the consumer.) In order to accommodate this increase in samples, it was necessary to change to single rather than duplicate analyses on each. Also, in order to maintain these programs at top efficiency, all other nonessential analyses were curtailed or eliminated. Mercury and heavy metal analyses were again performed for the Medical Services Branch of Health and Welfare Canada as part of their investigation of the Indian food fish safety program.

The chemical methods quality assurance program was continued again this year during spare time, concentrating primarily on histamine and indole (an indicator of quality) methodologies. The possibility of using the Childress chemical assay method for paralytic shellfish toxin was also examined. Considerable work remains to be done before a chemical method of suitable accuracy is developed.

Contact: Tom Klopp,
A/Senior Inspection Chemist.

District Offices and Laboratories

Southern Inspection District

In October 1980, the Southern Inspection District was incorporated as part of the Fraser River, Northern B.C. and Yukon Division, substantially increasing the geographic area covered by the District. In total, however, the responsibility remains mainly centered in the Lower Mainland and Sunshine Coast areas. There are 84 registered fish processing plants, 3 fish camps and approximately 4,000 boats operating in the Division. During the year, inspections were carried out on over 20 million kilograms of fish to assure compliance with quality standards, allowing for certification of more than 2,000 separate lots. Salmon exports comprise a major portion of the certificates issued, followed closely by shellfish.

Because of the paralytic shellfish poison closure during most of the summer, the District office had an unusually heavy workload, sampling and clearing individual commercial lots of shellfish during periods of partial openings and harvest under special permit.

The roe herring fishery operations in 1980 were limited by the fishermen's strike. The food herring fishery, on the other hand, caused some exceptional demands on staff when over 3,175 tonnes of fish were caught in an opening in the Gulf of Georgia which lasted only 27 minutes. Processing plants engaged in the fishery were taxed to the limit, in some cases for more than 5 days, in an effort to freeze the overflow of fish.

Contact: Dick Carson,
Southern Inspection Supervisor
Vancouver.

Northern Inspection District

The Northern Inspection District runs from Cape Caution to Portland Canal and from Masset inland, and includes 12 plants processing about 30-40 percent of the fish landed in B.C. Some remarkable changes occurred in the fishing and processing industries in 1980. In particular, B.C. Packers acquired the Canadian Fishing Company's Oceanside and Atlin fish processing plants, as well as various other holdings and properties. B.C. Packers' future plan is to construct a large processing facility at the Oceanside site. These plans are conditional on property acquisition and economic feasibility.

Every year, the Inspection District carries out more processing "inspections" as the industry expands to take advantage of various underutilized species. The fishing industry processes groundfish, sablefish (blackcod), ling cod, dogfish, roe herring, food and bait herring, spawn on kelp, halibut, shellfish and crustaceans, and salmon. It is not uncommon to observe processing of more than one species at a given time in a specific plant.

While the north coast of B.C. is closed to shellfish harvesting because of the sporadic and unpredictable nature of red tide blooms, there is a small but flourishing local commercial butter clam fishery in the winter months. Public health is ensured by testing PSP levels before and after the beach is harvested, and in the canned product before release for commercial sale.

The salmon industry, regardless of end-product form, requires considerable input from the Inspection District. All canned salmon is detained until sampled by inspectors and passed by the Canned Fish Inspection Laboratory. In addition, all canning and retorting operations are extensively scrutinized and monitored to ensure a safe quality product.

In the past, increasing quantities of salmon landings are being exported frozen. As such, pink and sockeye salmon must be top quality to be exported. Some companies prefer to stamp their better quality chinook, coho, and chum as well. The Inspection District spotchecks the plants to ensure compliance with the quality requirements. The resultant effect of export restriction is improved product quality through handling and improved monetary returns to the fishermen and the industry.

Other highlights of the past salmon season were the large landings of Alaska sockeye and pink salmon, most of which arrived by packer vessels from as far away as Bristol Bay. The fishing companies succeeded in landing a quality canning product through conscientious handling practices, the most significant of which was adequate chilling and holding facilities on the vessels.

In addition to the regular fish hold inspection program, freezer troller surveillance during construction and operation has increased, and the examination and assessment of the frozen salmon has also increased. The purpose is to further improve the landed quality.

The herring industry in B.C. has evolved considerably from the reduction fishery in the 1960s to the herring roe and food herring industry of the present. The 1980 food and bait herring fishery progressed relatively smoothly in the north, with increased quality herring products resulting.

In addition to these duties, the Inspection District provides a service as an information outlet for consumers, fishermen and the industry. Inspectors are called upon to act as arbitrators, teachers, trainers and public relations personnel. They address service clubs, school classes, youth organizations, and others in an effort to better serve the public.

Contact: Tom Perry,
Northern Inspection Supervisor
Prince Rupert.

Vancouver Island Inspection District

The Vancouver Island Inspection District covers fish processing plants on Vancouver Island, the Gulf Islands, Quadra and Cortez Island. There were 45 processing plants and/or cold storage plants and 39 fish camps operating in the District in 1980.

Raft and tray culturing of oysters is continuing to grow. As a result of a contamination problem with some raft-cultured oysters, the Victoria Laboratory took on a project in conjunction with the provincial Marine Resources Branch and the Vancouver Technological Laboratory. The Victoria laboratory involvement was to test bacteriologically both ground and raft oysters after 1, 3 and 6 days of storage at 5°C, 25°C and 35°C.

Roe herring processing was somewhat of a problem in getting herring to the processing plants due to the United Fishermen and Allied Workers' Union strike. Once the herring was at the plants, processing was carried out satisfactorily.

The geoduck fishery continued to expand, with harvesting under permit taking place in some PSP closed areas. The clam industry was restricted to harvesting under permit due to PSP blooms. This resulted in a 100 percent increase in PSP extractions (prepared from samples) to ensure that all molluscs entering the marketplace were safe for human consumption.

Contact: Wayne Holmes,
Vancouver Island Inspection Supervisor, Victoria.

Indian Fishermen's Assistance Plan

The Department of Fisheries and Oceans ceased to administer IFAP on June 10, 1980, and the Native Brotherhood of British Columbia, in conjunction with the Indian Fishermen's Development Board presently administrate the Program. A departmental representative continues to serve on the Board in addition to acting as a resource person in the continued administration of the Program.

Contact: Audley Tinglin,
Regional Manager.

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, including information on fire prevention equipment, fuel storage, life-saving 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.

After an assessment was made of the possible "privatization" of the Plan, a Ministerial decision was made to continue the Plan in its present format.

With the greater dissemination of information about the continued operation of the Plan, it is anticipated that, during 1981, there will be an increase in the total number of vessels insured.

In 1980, 1,069 vessels were insured for a total insured value of $25,582,700. Revenue from premiums totalled $625,620. Refunds (for cancellations and overpayments) totalling $70,838 were made. One hundred and seven accidents were investigated, and 73 claims totalling $904,300 were paid. The claims were divided as follows: 17 total losses ($394,450) and 56 partial losses ($509,850). The 73 claims comprised 17 strandings, 11 collisions, 14 explosions and fires, 7 sinkings and 23 due to miscellaneous causes (storms, thefts, deadheads, etc.).

At the end of the calendar year, there were 32 unsettled claims estimated to total $367,600. Administration costs of the Plan were $240,000.

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

Over 1,800 streams and watersheds in British Columbia and the Yukon Territory provide migration, spawning and rearing habitats for Canada's Pacific salmon stocks. Thousands of miles of marine foreshore provide productive spawning and/or living environments for juvenile salmon, marine fishes and shellfish, many of which share Canada's ocean fishing zone with purely pelagic (ocean) species. Much of the region's urban and industrial development is adjacent to fresh water, estuarine and marine foreshores, and most land use activities have potential to impact upon these habitats.

Habitat management activities in the region include the enforcement of Sections 20, 24, 28, 30, 31 and 33 of the Fisheries Act, investigation and resolution of project activities which threaten fish stocks or supporting habitats, applied research, development and maintenance of interagency liaison and project referral systems, contributions to the interresource planning linkages, and conducting internal and public information programs. Technical investigations include assessment of the impact of urban and industrial pollutant sources, dyking, dredging and construction projects, forest harvesting activities, hydroelectric and consumptive water use proposals, estuarine and other foreshore use plans. Detailed studies are directed toward determining the relationships between forest harvesting and salmon habitat and coastal streams; the productivity of marine and estuarine foreshores ecosystems, and the effect of major urban and industrial pollutant sources on salmon, herring, shellfish and shellfish stocks, and their supporting habitats. A regional project referral network annually co-ordinates Departmental response to over 3,000 land use, water use, and pollution projects originating from public, industry and other federal-provincial and municipal agencies. Industrial development proposals have initiated numerous intergovernment and multiagency and technical investigations.

Contact: Forbes Boyd,
Division Chief.

Coordination & Liaison

Referrals

During 1980, approximately 3,200 referrals, originating from all sectors of public and private agencies, were processed. The referral system is essentially an information source and provides continuous liaison between other government departments, the public sector and client groups. This activity, essentially a part of the Department's intelligence system in this region, is gradually being decentralized. Within the next few years, most of the referral work will be handled directly by District offices. This complements the present trend of various provincial government departments.

Seminar Programs

In an effort to provide District offices with updated information, a series of four seminars was conducted in 1980. The three-day sessions were held in Prince Rupert, New Westminster, Parksville and Kamloops. The seminars, attended by virtually every fishery officer in the Districts, covered a wide variety of subjects, ranging from policy formulation to project review. The program will continue in 1981.

SETG Participation

Habitat Division participated in several meetings of the Salmonid Enhancement Task Group, the primary public advisory body to the Salmonid Enhancement Program. Current estuary work was reviewed, and a variety of habitat management issues was discussed.

Revitalization Project

In July 1980, the Deputy Minister gave his support to a recommendation to develop a plan for the revitalization of the Department's fish habitat management program. The reasons for this decision centered on the fact that the fish habitat resource base is under severe pressure in a number of areas and that existing habitat management capabilities are being severely strained. The principal objectives of the proposed revitalization exercise are:

- to develop and implement an improved process for the yearly review, evaluation and planning of national and regional fish habitat programs
- to analyze and evaluate Department policies and capabilities in the habitat protection enforcement, management, and research at the regional and national levels
- to examine ways to increase the overall effectiveness of the Department's habitat management program.

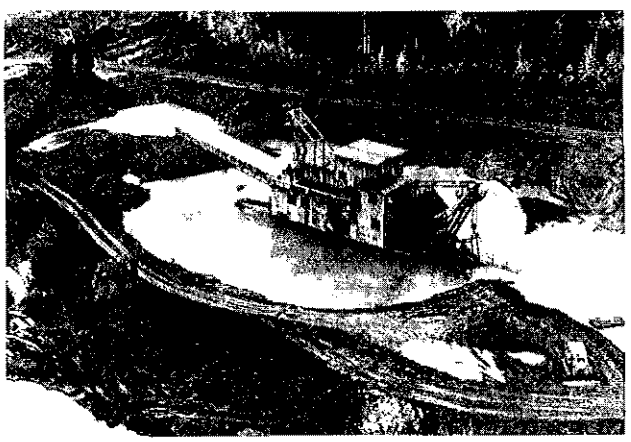
Landslide on the Queen Charlotte Islands. The effect of logging on fish resources is the subject of an intensive investigation.

Liaison with Federal/Provincial Departments

Continuous liaison occurs with numerous federal and provincial departments as part of the everyday operating procedure of habitat management. An example of this relationship is the interaction and ongoing discussions with the provincial Department of Forests. Numerous reviews and co-operative projects (see Carnation Creek and Queen Charlotte Island Study--Land Use Unit report) are now underway with that department.

As a result of current initiatives by the Province of B.C. in the area of resource planning, the Habitat Management Division in late 1980 undertook discussions with various elements of the provincial government to facilitate resource planning. This work will be stepped up in 1981 to ensure that the Department is actively involved in the overall provincial planning process where Fisheries resources and values are concerned. The Department would contribute data, inventories and general fisheries recommendations with respect to large areas of the province.

Contact: Tom Bird, Administrator,
Planning and Co-ordination.



Dredging for gold on Clear Creek, a tributary of the Stewart River.

Land Use

The Unit provides specialized technical advice regarding the prevention or mitigation of adverse effects on fish habitat from land-based activities such as logging, highway construction and flood control works.

Forest Harvesting

a) Carnation Creek Watershed Project

The Carnation Creek Project is presently yielding information that can be used to protect salmon habitat during logging operations. The project commenced in 1970 and was designed to include a pre-logging calibration (1970-1975), six years of logging (1975-1981), and five years of post-logging assessment (1981-1986). The last areas are presently being logged.

A number of component studies were carried out at Carnation Creek: long-term changes in gravel quality; changes in channel morphology; and streamflow impacts. Findings include:

- gravel sampling in the lower reaches of the stream utilized by chum salmon has shown that fines (small silt-like particles) in the upper layer of the streambed have increased since logging
- the most intensive streamside logging treatment has resulted in the removal of large stable instream debris and the addition of small unstable debris. As a result, the channel morphology in certain reaches appears to have changed to conditions that are less desirable as fish habitat.

Staff members have participated in a number of presentations to explain the results of the study. Several reports are projected for completion during 1981.

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

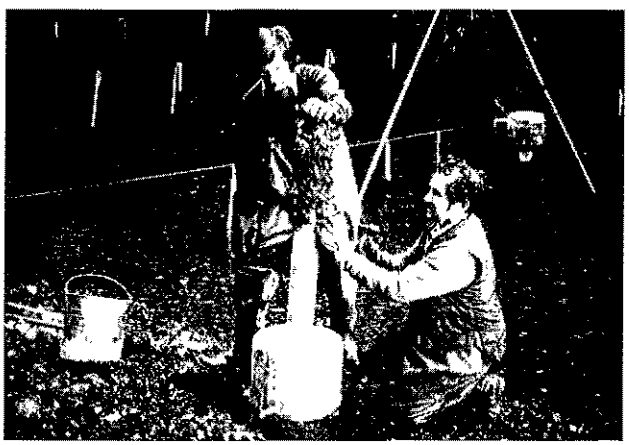
An intensified research program was proposed to resolve conflicts inherent to steepland logging in areas with

landslide potential on the Queen Charlotte Islands. The Forest Harvesting Group participated in an interagency committee that proposed a set of recommendations to minimize future conflicts, and a research program to address key questions related to steepland logging.

The committee (with representatives from the Department and the provincial Ministries of Forests and Environment) has been charged with the direction of a three-year $800,000 study consisting of the following components:

- a synoptic survey of streams
- rehabilitation of small streams
- a synoptic survey of forest sites
- rehabilitation of forest sites
- silvicultural investigations
- alternative yarding systems.

This research should help to resolve potential resource conflicts in the Queen Charlotte Islands and other steepland areas of B.C.



Gravel sampling for the Carnation Creek watershed project.

c) Forest Harvesting Handbook

A handbook collating background information and guidelines to minimize the impacts of forest harvesting operations on aquatic habitats was produced. The handbook outlines the measures which are necessary to protect habitats considered essential to the maintenance of fisheries resources. Distribution to district staff is planned for the spring of 1981.

d) Tsitika River Integrated Resource Plan

The Tsitika River drains a 34,400 ha, unlogged watershed on the east coast of Vancouver Island which, until recently, was under a logging moratorium imposed in 1973. The anadromous fish species which utilize the system include all five species of salmon, as well as Dolly Varden char and steelhead trout.

In response to a request by the provincial Ministry of Forests, the Forest Harvesting Group has actively participated on a planning committee that prepared an integrated resource development plan for this watershed. This planning process included a fisheries resource inventory within the watershed, the identification of sensitive fish habitat, and the establishment of innovative guidelines in a folio format intended to ensure the preservation of the salmonid resource of the Tsitika River watershed. In addition, a series of public meetings was held in different centers on the Island to facilitate public input. Logging operations and ongoing problems will be monitored and resolved by the Follow-up Committee. An assessment of the use of Robson Bight by killer whales is currently underway.

e) Fraser River Debris Catchment Basin

To reduce the amount of floating debris in the Strait of Georgia generated from natural sources and logging activities within the Fraser River watershed, the provincial and federal governments, in conjunction with the Council of Forest Industries (COFI), established a debris catchment basin in the lower Fraser River near Wahleach Island downstream from Hope. Floating debris is diverted during the freshet by two "fin booms" which extend approximately 2.4 km upstream of the basin.

Merchantable logs caught by these booms are removed, and all remaining debris is burned on site in the fall, after river flows recede. To complement this operation, COFI has also established an outload site in New Westminster to facilitate the salvage of debris and logs from the lower river.

Annual damage to industrial and recreational boats and equipment from uncontrolled, waterborne debris on waterways and beaches will be substantially reduced by continuation of this catchment program.

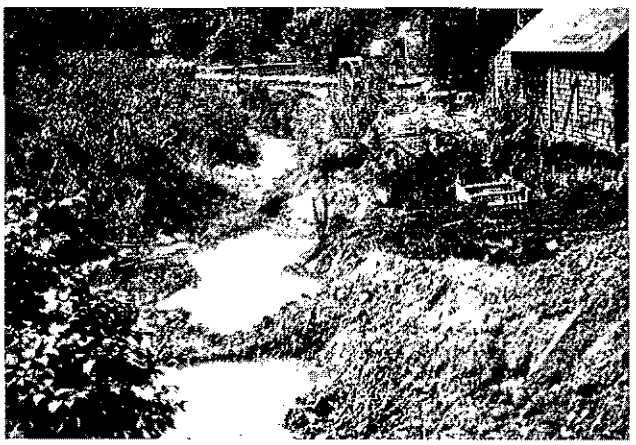
f) Sayward Forest Land Fertilizers

In cooperation with the Ministry of Forests and the Fish and Wildlife Branch, the Department is presently monitoring water quality and other characteristics of Mohun Lake and its contributory watercourses in the Sayward Forest. It is intended that the forest fertilization program, in concert with juvenile tree spacing, will increase the growth and quality of future timber harvests. The fertilization program consists of applying urea fertilizer pellets on the hillsides by helicopter.

The potential for urea and nitrogen deposition and release into the receiving waters of the watershed is related to the varying widths of buffer zones adjacent to the watercourses. As the effects of such large-scale fertilization programs in B.C. are undocumented, the study of the Mohun Lake area is viewed as an excellent opportunity to understand better the impacts or potential lake fertilization benefits. A report on the fertilization activities concludes that the activity could provide a valuable source of nitrogen for fish food production, but great care must be exercised in the application in view of the potential for shock loading.

g) Log Handling

A number of major log handling proposals were assessed to determine their actual and/or potential impacts on freshwater, estuarine and marine habitats. These assessments included both habitat determinations and technical reviews of the proposed industrial activities. Specific locations included Adams Lake, Quesnel Lake, Shuswap Lake, Crofton, Goliath Bay, Campbell River, Wannock River.



Stream encroachment caused by the installation of a sanitary sewer.

h) Forest and Range Resource Analysis

A brief was prepared outlining fisheries concerns with respect to the analysis of available timber resources being undertaken by the Ministry of Forests. The magnitude of the fisheries resource, the potential fish habitat impacts from forest harvesting, and comments on Forest Service policy including timber supply analysis are included in the brief. The review of timber and range resources was considered timely in view of the need for updating and integrating the management of all forest resources. The brief recommended, among other things, that fish habitat requirements and upland stability be considered at an earlier stage of forest harvest planning to ensure that sensitive zones and the fishery resources in a watershed are recognized and protected. The priority within watersheds of resources other than timber has now been acknowledged.

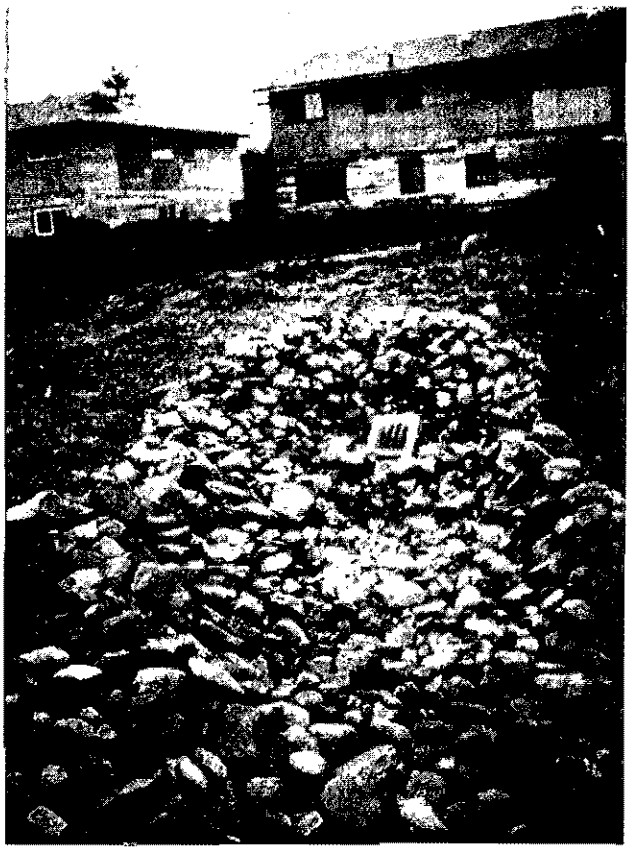
Continued involvement in the development of specific timber supply areas is anticipated.

Urban Development

The Urban Development Group was formed in the latter part of 1973 to attempt to minimize the impacts of extensive land development on adjacent salmon streams. The Group's input was, at that time, directed primarily to the Lower Mainland where major developments were occurring. Most work has come through referrals, with problems reviewed on a site-specific basis. Although Lower Mainland referrals remained a major function of the Group in 1980, urban pressures are now being felt in other areas outside of the Lower Mainland, notably Vancouver Island and the Central Interior.

The Urban Development Group is now focussing more on planning rather than site-specific evaluation. Major efforts by the various government levels in British Columbia to develop comprehensive land use plans for their areas are viewed as encouraging. By providing input into the early stages of these plans, the Department now has the opportunity to achieve habitat protection through local government. Streamside green strip preservation, water quality and quantity requirements can all be taken into account in the development of these plans and can prevent resource conflicts.

The Group is also having an impact in areas of stormwater management. Conventional storm sewer disposal is deleterious to aquatic life, and municipal governments are now realizing that this method is also impractical and expensive. Stream channelization, flood protection and increasing pipe sizes are characteristic of conventional storm drainage and have proven to be more expensive than designing facilities which will store increased flows and maintain predevelopment run-off rates in a watershed. "Zero-increase in run-off" is now being practised in most municipalities in the Lower Mainland. Other centers such as the cities of Nanaimo, Port Hardy and Campbell River are looking at developing similar stormwater management plans.



Urban development resulting in stormwater drainage into a salmon stream.

a) Hemlock Valley Recreations Ltd.

Following the November 1977 flood which caused considerable damage to Weaver Creek and the International Pacific Salmon Fisheries Commission's spawning channel, the Group assisted in the development of drainage, erosion and sediment controls, debris removal and sewage treatment policy for the Hemlock Valley area. The development concepts for the Valley were altered by the owners in 1980. While the original plan showed a sprawling subdivision type of development, the new direction is towards a concentrated town center

concept. Environmental impact is expected to be reduced, however, considerable input by the Group will still be necessary to protect the valuable salmon resources downstream.

b) Falmurden Development, Big Qualicum River

Because of its proximity to the Big Qualicum River hatchery, this development is of considerable concern to the Department. If development of this area is to be considered, the following must be assured:

- buffer strips must be provided to preserve bank integrity between the development and the Big Qualicum River
- surface run-off must not be directed to the Big Qualicum River
- although the major part of the proposed 0.2 ha lot development is downstream of the fish facility, the Department must be assured that septic tank effluent from the development will not pollute the river or facility. An analysis based on the assimilative capacity of the soils and the groundwater flow patterns has been requested.
- no further subdivision below five acres should be allowed upstream of the facility.

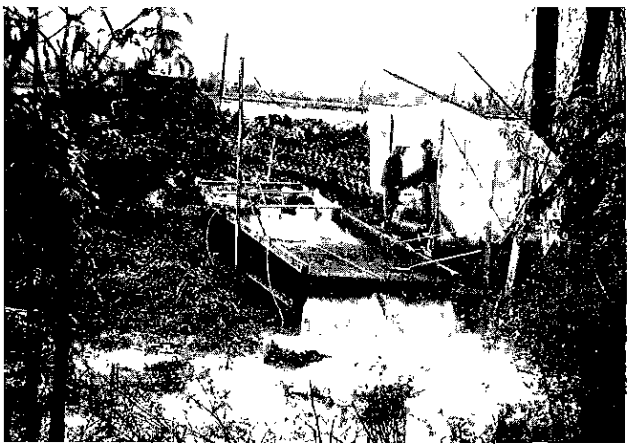
Because of the location of this proposed development, it may be possible to avoid surface and subsurface contamination of the facility. This may not be the case further up river and the Regional District Settlement Plan should take this into account.

c) Tod Mountain Development (Kamloops)

A major expansion of the Tod Mountain area is proposed over the next few years, including a town center, residential subdivision development, ski hill development and four-season recreational facilities. Run-off from this area discharges into Louis Creek, a valuable coho stream. Initial input has been provided and the owners have indicated that further input by Fisheries will be welcomed throughout the development of this area.

d) Seymour River Corridor (Shuswap Lake)

The Columbia-Shuswap Regional District has expressed a desire to create an environmental corridor along the Seymour River similar to that on the Adams River. The Group has provided expertise and input into determining the width requirements for this corridor.



This installation enables biologists to monitor the number of downstream migrant fry caught in the dredging operation.

e) Settlement and Community Plans

Fisheries input has been provided into planning for the following areas:

- Nanaimo Regional District: Shaw Hill-Deep Bay Settlement Plan, Nanoose Settlement Plan
- Port Moody: Anmore Area, Drainage planning for Ioco-Anmore area
- Coquitlam Town Center: Drainage planning and subdivision development for Hoy Creek watershed
- Nunns Creek Development Area: Campbell River Community Plan
- Port Hardy: Stink Creek Drainage Plan.

f) Salmon River Cooperative Management Study

A Steering Committee which includes Department representatives is

overseeing the development of a management plan for the Salmon River. The plan was developed and is being undertaken by Howard Paish and Associates and is funded by SEP.

The Urban Development Group will increase its efforts in 1981 to achieve habitat protection through local government planning. As local governments have legislative control over various aspects of land use, particularly land development, fisheries protection can be achieved through municipal and regional bylaw, policy and attitude.

It is hoped that the further development of protective prescriptions and mitigative measures, as well as an analysis of guideline effectiveness can also be accomplished in 1981.

Linear Development

Construction of major transportation systems such as highways, railways, pipelines and powerlines often conflicts with rivers, streams and lakes, sometimes with serious consequences to fish and fish habitat. The Linear Development Group maintains close contact with transportation agencies during the planning, design and construction of these projects to ensure that impacts are kept to a minimum through proper environmental design and the application of appropriate mitigative techniques.

For example, design of the Coldwater River portion of the Hope to Merritt (Coquihalla) Highway is being preceeded by a detailed study of fish habitat within the floodplain, conducted by a team of specialists funded by the Ministry of Highways. The team consists of a hydrologist, a geomorphologist and a fisheries biologist. Information from the study will be used for making road location and design decisions as well as for identifying enhancement opportunities. Habitat creation and rehabilitation projects will be incorporated into the road design and it is anticipated that they will result in a net increase to habitat values in the upper Coldwater River.

Other highway projects undergoing review by this Group are the Meziadin Highway, Yellowhead Highway and portions of the Vancouver Island Highway. Bridges are considered separate from road construction projects, and a large number of new designs require individual attention each year.

The CNR has made a major commitment to double-track their existing mainline from Edmonton to Vancouver. Because their existing track closely parallels the Albreda, North Thompson, Thompson and Fraser Rivers, construction of an additional track could result in many serious conflicts with adult salmon migration as well as with spawning and rearing habitat. A preview of some of the conflicts associated with double-tracking became evident during review of a small section of the scheme between Kamloops and Vinsulla in which encroachment on the North Thompson River was considered to be potentially detrimental to upstream migration, requiring modification of fill designs. The Linear Development Group is currently negotiating with CNR to ensure that environmental preplanning is given a high priority in their development process, and they have agreed to prepare an overview report as a first step in this direction. Over the next few years, the Group will be participating in bioengineering studies to further address the issues raised by construction of a second track.

The Group is also involved in review of B.C. Hydro powerline proposals, including the Cheekeye-Dunsmuir Line between Squamish and Vancouver Island. The line crosses a number of important salmon streams, including the Cheakamus River, and construction on portions of the corridor has already begun. Concerns regarding the falling and removal of trees, the building of access roads and clearing adjacent to stream

banks are addressed prior to construction and provisions for environmental protection are incorporated into contract documents.

Pipeline projects are evaluated to ensure that the timing and method of river crossing will minimize effects on fish and the habitat. These projects range from major proposals such as the Alaska Highway Gas Pipeline, to small crossings by B.C. Hydro Gas. In 1980, looping of the Pacific Northern Gas Line between Terrace and Kitimat and a methanol pipeline associated with the Ocelot Industries plant in Kitimat were evaluated. Preliminary discussions were held with proponents regarding a natural gas pipeline to Vancouver Island and pipelines reqired for proposed liquid natural gas and petrochemical plants.

The river channel is narrowed to accommodate the wider road bed for the second track of the CNR mainline.

Placer Mining

a) Yukon

An inventory of the aquatic and wildlife resources in several Yukon streams subject to placer mining was conducted during March, May, July, and September, 1980. The primary objective of this project was to inventory fish resources; however, water quality and benthic invertebrates were sampled by the Environmental Protection Service and wildlife observations recorded by the Department of Indian Affairs and Northern Development. Seven streams were studied ranging from small streams (e.g. Duncan Creek) to major rivers (e.g. South Big Salmon River). These streams are all located in the south-central Yukon Territory. Placer mining activity on the creeks included sluicing, dredging, and hydraulic mining.

Placer mining had a significant effect on three streams: Clear Creek, Johnson Creek, and Duncan Creek. In these streams, suspended sediment concentrations were often between 1,000 and 4,000 mg/L below the mines, whereas in undisturbed areas sediment levels were usually less than 100 mg/L. Arctic grayling were found in all streams studied; however, spawning and rearing in streams with high sediment loads were limited. Juvenile chinook salmon were caught in four of the seven creeks. The two largest rivers, Big Creek and the South Big Salmon River, were also identified as spawning areas for this species. Benthic invertebrates were fewer downstream of placer mines than in other comparable areas. The results of this study will be used to assist in the development of guidelines for the protection of fish resources in placer mining areas.

b) British Columbia

In 1980, one hundred and eighteen referrals were received from the British Columbia Department of Energy, Mines, and Petroleum Resources regarding new placer mining leases. For each lease, mining conditions designed to minimize impacts on fish resources were specified. Three standard sets of conditions are applied depending on the fish utilization of the stream. The strictest provisions (red code) are applied to salmon spawning streams, whereas lesser restrictions are placed on migratory routes and rearing areas (yellow code) or creeks with no salmon present (green code).

Placer leases are restricted to 23 areas designated for placer mining in British Columbia. Under the Placer Mining Act, additional areas can be designated for placer mining only upon approval of the other resource management agencies and recommendation of the Minister of Mines. In 1980, about 30 requests to designate new areas for placer mining were reviewed and one new area was designated.

Inspection tours of the Barkerville, Fraser-Bralorne and Lillooet designated areas were conducted. Twenty-seven placer mines were visited and all were operating within the conditions specified by the Department. Water used for sluicing was recycled and all effluents were discharged into deep pits rather than into the stream.

Dredging

During the 1980 downstream fry migration period in the Fraser River, three suction dredges were monitored to determine the entrainment rate (i.e. the number of fry drawn into the dredge intake pipe and deposited on land). Most fry were captured by a dredge in the Annacis Island area (12,700 pink, 142 chum), whereas only nine were caught in the vicinity of Fort Langley. The 12,700 pink fry entrained represents 0.0004 percent of the total number of downstream pink migrants. The fact that few chum fry were caught can be explained by the migratory patterns of the fish and the operating procedures of the dredges. Various studies have found that chum fry generally migrate in the upper 3 m of the water column, whereas pink fry are found at all depths. During the 1980 downstream migration, dredging was not permitted in water less than 4.8 m deep and the pump was only turned on when the cutterhead was within 1.5 m of the river bed. This operating procedure reduced entrainment of chum fry to a minimum.

Based on the above results, the following provisional changes have been suggested for the **Fraser River Dredging Guide:**

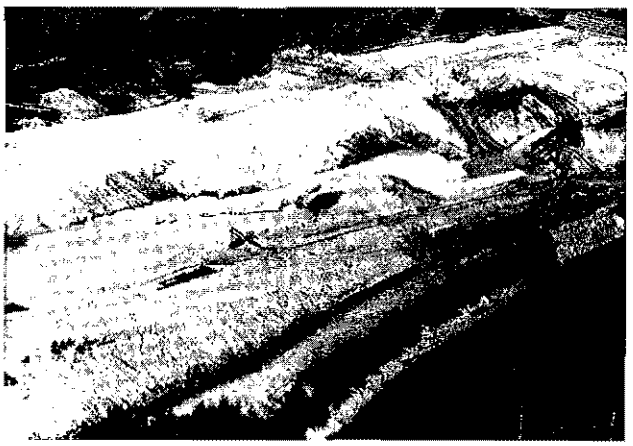
During the period of March 1 to June 1 on odd numbered years, suction dredging on the Fraser River will be permitted subject to the following conditions:

1) Water depths in the area to be dredged must be a minimum of 4.8 m;

2) The pump shall not be operated except when the cutterhead is within 1.5 m of the river bottom;

3) Dredge surge valves must be adequately screened.

In 1981, the Department of Public Works' hopper dredge, Fort Langley, will be monitored to determine an entrainment rate for this type of dredge.



Placer mining on Thistle Creek, a tributary of the Yukon River.

Flood Control/Gravel Removal

In addition to the review of many proposals for river bank erosion protection, input was provided to the major continuing programs of flood control on the Fraser River and in the Pemberton Valley. The Group represents the Department on the Vedder River management and technical committees which are charged with developing a multi-use plan for the area between the setback dykes. Repair proposals arising from damage caused in the December 1980 floods will be reviewed in 1981.

A document was prepared describing the administrative arrangement between the Department and the Fish and Wildlife Branch for dealing with gravel removal applications.

Contact: John Payne, Chief,
Land Use Unit.

Water Quality

The Water Quality Unit is responsible for ensuring that acceptable water quality conditions in the freshwater, estuarine and marine environments are maintained. The mandate of the Unit is derived from the provisions of the Fisheries Act pertaining to prohibitions against the deposit of deleterious substances into waters frequented by fish [Section 33(2)] and other sections, such as 33.1, which provide authority to deal with specific pollution problems and with protection of fish habitat. In meeting 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, pulpmill effluent) in freshwater, estuarine and marine environments. The Unit also coordinates the interagency waste management, pesticide and ocean dumping referral system within the Department, 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.

Freshwater Section

The Freshwater Section of the Unit was involved with two major studies in 1980. The impact of domestic sewage discharged into the Cowichan River was investigated using **in situ** salmon bioassay techniques, receiving water and effluent chemistry analyses, periphyton (attached algae) standing crop determinations using **in situ** artificial substrates, and assessments of benthic (bottom dwelling) invertebrate communities. The study was initiated because of concerns about possible impacts of increased nutrient loads entering the river in important salmon spawning and rearing areas.

Preliminary results suggest that nutrients, primarily nitrogen forms, may be accelerating benthic algae growth in the river during critical low river flow periods. The study will be continued in 1981 to obtain further information on the impacts of sewage discharges into rivers and to ascertain the need for additional effluent treatment.

The second study conducted under the direction of the Freshwater Section was funded by the Salmonid Enhancement Program (SEP). It is an assessment of the impacts of hatchery effluents on receiving water quality, benthic invertebrates and river periphyton production. A number of hatcheries are being examined in the study, which began in 1978, including the Qualicum, Puntledge and Capilano hatcheries. The study will terminate in 1981 with a final report and recommendations on effluent treatment strategies for hatcheries.

The study will help to develop hatchery effluent guidelines for use in existing and proposed hatcheries. Other SEP-related activities in 1980 included participation on the South Coast Geographic Working Group, and serving as a contact for SEP community advisors.

In 1980, major emphasis was devoted to assessing major mining proposals and their possible impacts on fish and fish habitat. Both base metal and coal mining have grown significantly in the past 2-3 years. A large open pit coal mine (Quinsam Coal) has been proposed for the Quinsam River watershed, and a

final review of the proposed mine and development of a Departmental position will be completed in early 1981.

Another major and controversial mine development is the Amax mine at Alice Arm. The Water Quality Unit reviewed the mine tailings disposal scheme, developed a monitoring program and contingency plans, as well as on-site data collection programs, and participated in Regional District and interagency meetings.

An existing mine on Vancouver Island, Western Mines Limited, discharges mine tailings into Buttle Lake which ultimately drains into the Campbell River. Because of concerns about potential heavy metal impacts on salmon in the Campbell River, the need for alternative tailings disposal or treatment techniques will be determined. A number of other mine proposals (e.g. Dolly Varden silver mine, Alice Arm; Norco Coal Mine, Bowron River; Consolidated Cinola gold mine, Queen Charlotte Islands) also involved varying degrees of review and assessment by the Freshwater Section in 1980. Continued expansion of the mining sector will require major involvement by the Unit in order to keep abreast of new developments.

Two major referral systems are coordinated by the Freshwater Section: for waste management and pesticides. Approximately 230 waste management applications for the discharge of effluents or disposal of solid waste were reviewed and assessed in 1980. Applications received from the Environmental Protection Service were reviewed and Department positions on each application formulated. Other important applications included a new pulpmill proposal at Quesnel and major sewage discharge by the City of Kamloops.

About 300 pesticide (insecticides and herbicides) applications were also assessed. In 1980, major attention was devoted to assessing the potential impacts of new pesticide products. The use of a new herbicide, krenite, was significantly restricted by the Unit. The Department is against the extensive use of the herbicide because of concern about potential impacts of the chemical on salmon and other aquatic organisms. As a result of this concern about the impacts, the Department is going to review its policy based on the data obtained from lab experiments which assess the toxicity of the herbicide.

The Department is represented on the B.C. Aquatic Weed Advisory Committee. The Committee is responsible for providing a forum of experts on aquatic systems and management approaches to evaluate impacts, research and control measures relating to aquatic weeds.

In 1980, the Section participated in the federal/provincial Thompson River Basin Preplanning Study. The preplanning study was designed to describe the Basin's water resources and the existing and potential opportunities and problems relating to the management of the water resources of the Basin. A detailed report on water quality/quantity and fisheries conflicts in the Basin was prepared, and sections of a final preplanning report include recommendations on required action in the Basin.

Reports completed in 1980 were on the effects of coal dust on crab respiration, and consultants' reports on benthic invertebrates in the lower Fraser River, dissolved oxygen levels in the Fraser River, and tidal influences on Annacis Island sewage.

Section staff also respond to fish kills, chemical spills, answered public inquiries, and were represented on the Hat Creek Thermal Power and Fraser River Estuary Task Forces.

Marine Section

The Marine Section participated in one major study in 1980. In collabora-

tion with the Resource Services Branch's Research Section, a study was conducted on the impacts of sewage discharged from the Iona Island sewage treatment plant on receiving waters of Sturgeon Bank. This study was designed to assess the effect of the effluent on the distribution and abundance of fish, primarily juvenile salmonids, in areas receiving sewage effluent compared with "control" areas not influenced by sewage. An assessment of the impact of sewage on the survival of juvenile salmon using **in situ** bioassay techniques and on receiving water quality (e.g. dissolved oxygen), and the uptake of heavy metals in transplanted oysters was included in the study. The study demonstrated that fish avoided areas receiving the highest concentrations of effluent. Some locations in the sewage channel experienced reduced dissolved oxygen levels (less than 1.0 mg/L) under certain weather and tidal states. Rapid mortalities of salmon in bioassay cages also occurred, presumably as a result of extremely low dissolved oxygen levels. During the study, a kill of large numbers of stickleback, sculpins, shrimp and other fish and invertebrates occurred, and gulls and other birds preyed heavily on dead and stressed fish and invertebrates. Further studies at Iona are planned in 1981.

The distribution and abundance of juvenile salmon in selected foreshore habitats of the Fraser River estuary were also studied.

The potential impacts of the proposed Ocelot Industries methanol conversion plant at Kitimat were assessed, and recommendations on effluent treatment and disposal, spill contingency plans, and stormwater control developed.

Reviews and assessments of several pulpmill monitoring programs (e.g. Port Alice and Gold River) and proposals for ore concentrate, oil storage and chemical shipping facilities were also completed in 1980.

The Department participated in National Energy Board (NEB) hearings on Trans Mountain Pipeline Limited's application to transport Alaska oil off B.C.'s west coast. Staff were also subpoenaed by an environmental group to present testimony at the NEB hearings. In 1981, a final report summarizing the Trans Mountain evidence and results of the NEB hearings will be prepared. It is expected that in 1981 and future years the Marine Section will be heavily involved with oil transportation issues and offshore drilling proposals for oil and natural gas.

The Marine Section is responsible for coordination of the ocean dumping referral system within the Department. In 1980, 70 ocean dumping applications were reviewed and responses formulated. Unique applications included an oil burning experiment in Howe Sound designed to assess the efficacy of oil containment booms during oil burning conditions. Marine Section staff attended the experiment and will be reviewing water quality data obtained during the burn. **In situ** bioassays with juvenile salmon were conducted to assess the effects of a clamshell dredging operation in the lower Fraser River. As part of the Section's ocean dumping responsibilities, personnel also serve on the Regional Ocean Dumping Technical Subcommittee.

A Waste Management Branch permit authorizing the discharge of sewage at Ganges Harbour was reviewed in a public hearing conducted by the Pollution Control Board. As a result of the hearing, the length of the sewage outfall pipe was increased, as was the allowable depth of discharge.

The Section also responded to oil spills, answered public inquiries regarding marine pollution and served on the Squamish Estuary Management Plan Task Force.

Chemistry Laboratory

The Chemistry Laboratory is jointly funded by the Department of Fisheries and Oceans (Water Quality Unit) and the Department of the Environment (Environmental Protection Service), and is situated in West Vancouver. The laboratory's function is to provide chemical analyses of water, effluents, sediment and biological tissue to meet the needs of both departments.

In 1980, the laboratory performed 41,000 analyses which represents a 10 percent increase over 1979. Laboratory staff were involved in a number of legal cases, many requiring court appearance where staff serve as technical and expert witnesses. Major accomplishments in 1980 included the following:

- **Automation:** The trend in inorganic chemistry is towards automatic instrumentation "on line" to a central computer system. Such tests as for ammonia, nitrate, ortho and total phosphates are now fully automated. Tests for chloride, silica and sulphate are automated but not on line as yet.

- **Trace Metals:** Commercial introduction of the Inductively Coupled Plasma (I.C.P.) has greatly enhanced multi-element analysis. Presently, the I.C.P. in use at the chemistry laboratory can determine simultaneously 25 elements in water, 23 elements in digested tissue, and 20 elements in digested sediments. It performs 85 percent of the trace metal requirements, the remaining portion analyzed by flame atomic absorption and carbon furnace atomic absorption. The I.C.P. is now in the process of being fully automated.

- **Organic Analysis:** The organic section of the chemistry laboratory has increased its capability for the analysis of pesticides, pentachlorophenol and polychlorinated biphenyls. Currently, only a limited number of samples can be processed, but along with the analysis of hydrocarbons and resin acids, the nucleus of an organic laboratory is present.

The Chemistry Laboratory, which utilizes highly sophisticated equipment, has been stressed by inflationary pressure associated with service and replacement costs. To meet the higher costs, the laboratory has instituted a mechanism to recover excessive costs associated with specialized projects, legal sample analyses and court appearances.

Contact: Mike Nassichuk, Chief,
Water Quality Unit.

Water Use

The Water Use Unit is responsible for the technical assessment and resolution of problems of a large scale nature as they relate to the application of Sections 20, 28, 31 and 31.3 of the Fisheries Act. The primary activities of the Unit relate to impact assessment and negotiation for utilization and compensation relative to hydroelectric generation, water diversion for municipal and industrial use, foreshore development in the marine and estuarine environment, marina harbors and port development.

Freshwater Management

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) Whitehorse Rapids Hydro Project

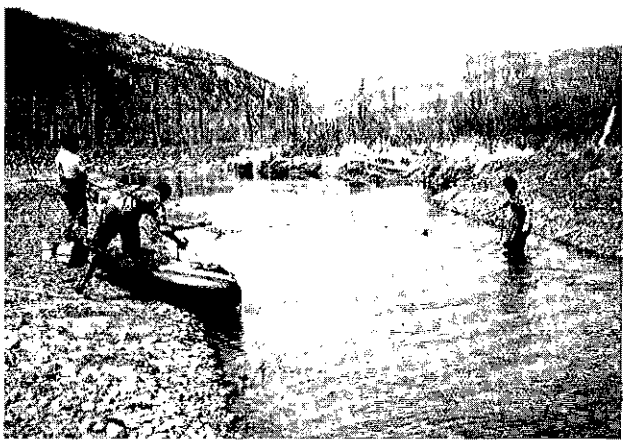
The Northern Canada Power Commission (NCPC) constructed a hydro generation station on the Yukon River at White-

horse Rapids in 1956-58. Although a fishway was ultimately provided to permit upstream passage of chinook salmon, the problem of downstream turbine mortalities was never addressed. In 1973, when chinook salmon escapements were declining sharply and reasons for the decline were being sought, it was determined that the bulk of downstream migrants were smolts rather than fry and that the turbine mortalities for smolts were approximately 20 percent. In 1975, NCPC applied for a water licence to cover the existing plant and an expansion to the facilities. The Minister of Fisheries and Oceans adopted the position that compensatory hatchery facilities would have to be installed by NCPC to offset the turbine mortalities, whether or not an expansion took place, and that the existing fishways and collection systems would have to be modified at NCPC's expense if the expansion took place. Since then, a mini-hatchery has been designed, and negotiations have reached the final stages. The Commission is now proceeding with final designs for the plant expansion, with construction and operation expected to commence in late 1982.

b) Kemano Completion Project

When the Aluminum Company of Canada applied for a water licence for its Kemano generating facilities in 1950, it received a conditional water licence, to be finalized in 1999, which would permit the generation of slightly in excess of 1,300 megawatts of power. The installed facilities for the first phase known as Kemano I can generate 800 megawatts. The second phase of development would involve a further diversion from the Nechako River plus damming of the Nanika River.

In 1979, Alcan indicated their intention to proceed with this second phase. Engineering and biological studies were commenced to examine the feasibility of the project and the implications on fisheries and other resources. Envirocon Ltd. was retained by the company to undertake the environmental studies. Fisheries studies have since been undertaken by Envirocon in the Nanika, Morice and Nechako Rivers to supplement information obtained previously by the Department of Fisheries and Oceans in conjunction with B.C. Hydro's investigations in this system.



Collecting biological data in preparation for a watershed management plan for the Nicola River.

During the spring of 1980, Alcan indicated their intention to maintain flows in the Nechako River as low as 500 cfs throughout the balance of the year. This would have jeopardized chinook stocks which spawn in the upper Nechako River, as well as sockeye migrating through the lower river. The Department therefore requested an increase in flows. When Alcan refused to comply, the Department applied for an injunction through the Supreme Court of B.C. to have flows raised to levels prescribed by the Minister. This injunction was granted, and Alcan has since been releasing the required flows into the Nechako River. As a result of this action, Envirocon has intensified their studies on the Nechako River and the Department began further studies to more clearly define chinook incubation and rearing requirements. The International Pacific Salmon Fisheries Commission also undertook additional stu-

dies to determine flows necessary to limit water temperatures during the sockeye migration period.

c) Stikine-Iskut Hydro Project

B.C. Hydro has proposed two dams on the Stikine, both above the known limit of salmon migration, and three on the Iskut, also above the known limit of salmon migration. Engineering and environmental studies by B.C. Hydro are in progress. Fisheries studies in both the estuary and river have been undertaken to document the resources which would be affected by the proposed project. To date, the focus of fisheries work has been: species usage of the river relative to distribution and spawning; food abundance for juvenile salmon throughout the river; timing of the downstream migration; surface water interface and other hydrological studies; limnological - reservoir studies; and socioeconomic assessments.

The Water Use Unit will be responsible for reviewing the impact statement, the development proposal, and construction plans relative to the proposed altered flow regime.

Water Management Studies

a) Shuswap Lake

The Water Use Unit has taken a "no development" stance on proposed foreshore alienation where productive fish habitats are involved. A two-year program has identified key productive foreshore areas where development should not be permitted. Foremost among these were the undeveloped portions of the Sicamous Narrows, a principal chinook salmon rearing area within the system. As many as four thousand chinook juveniles were captured in a single beach seine set over marshy habitat between established marinas. As a result of the Department's objection to further development, an acceptable land use and development plan was conceived and will be implemented. The study will be published in March 1981, and should create a public awareness of the significance of certain types of foreshore to fish production. It will also contribute to development of an overall regional planning strategy.

b) Salmon River Flood Control Pumps

In order to control the extent of flooding in the lower Fraser Valley, many of the small tributaries of the river are pumped over the dyke system at certain times of the year by means of high volume pumps. The Salmon River at Langley is one such stream, and it is a well-known coho salmon and steelhead trout producer. The pumps are operated at the same time as the normal downstream migration of coho. Investigation revealed that the pumps were not being operated properly in relation to the flood stage of the river, but turned on according to the calendar, and as a result were operating unecessarily for several weeks. The Salmon River pump was capable of causing smolt mortalities in excess of 30 percent.

In 1981, the Unit will operate a fish salvage program on the Salmon River and several other Fraser River tributaries where flood pumping is causing high fish mortalities. Negotiations with municipalities responsible for the flood control pumps are planned in order that operating schedules of pumping facilities may be altered to allow a greater proportion of downstream migrant smolts free access to the Fraser.

c) Coquitlam River

A federal/provincial water management report on the Coquitlam River was completed in 1978. It identified the need for the control of silt discharges from the gravel mining operations to protect salmon spawning beds in the mainstem river, and the need for the Department of Mines and Petroleum Resources to exercise its responsibilities under the Mines Regulation Act to control these silt discharges and institute acceptable reclamation practices. The report further recommended that the District of Coquitlam

withdraw the reclamation regulations under its bylaws insofar as the gravel pit operations were concerned. As a result of these recommendations, the municipality discontinued its reclamation efforts, and after some negotiations, the Department of Mines and Petroleum Resources took over. At that time, the Habitat Protection Division advised the gravel pit operators that their operational plans for gravel removal and silt control were unacceptable and would have to be substantially improved to meet with the requirements of the Fisheries Act.

B.C. Hydro has proposed two dams on the Stikine River, above salmon migration limits.

Subsequently, the local inspector of mines began negotiations with the operators towards implementing proper mining procedures to prevent mass slumpages in the working areas, diverting the watercourse away from working areas and providing for adequate settling ponds. In spite of considerable effort on the part of the various concerned agencies, there has been little net progress to date, particularly with the largest operation, Jack Cewe Ltd.

In February, 1980, Jack Cewe Ltd. was charged by the Fish and Wildlife Branch for 17 violations of the Fisheries Act. The company was subsequently convicted on all counts.

In December 1980, the Ministry of Mines and Petroleum Resources, the Ministry of Environment and this Department formed a committee specifically to better coordinate all efforts towards the solution of the silt abatement problem.

d) Duteau Creek

Several years ago, 1,000 acre feet (1,233,000 m^3) of water storage was obtained for the maintenance and enhancement of the fisheries in Duteau and Bessette Creeks. This joint 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, which includes releasing suitable flows for fisheries. To date, they have not cooperated in this respect. In November 1980, both the Vernon Irrigation District and the deputy comptroller of Water Rights contended that the only water that the District is obliged to release into Duteau Creek is the 1,000 acre feet of storage. Efforts are now being made to resolve the conflicts that have developed over this issue.

e) Marble River

A study of the Marble River, published in 1980, examined the hydrology and water use of the Marble River watershed. The study also compared storage alternatives (Victoria, Alice and Benson Lakes) for regulation of in-stream flows, and provided data on the distribution, timing, escapement and economic value of the several Pacific salmon species. Upstream fish passage problems at Twin Falls, Bear Falls and Lake Outlet Falls, and the remedial work done to date on these falls were reviewed. The report recommended that additional work on the falls be carried out to improve upstream fish migration, fisheries flow releases from the existing dam on Benson Lake be arranged, and

storage on Victoria Lake be developed.

f) Nicola River

The Nicola River system is an important producer of chinook and coho salmon. In addition, the system is heavily utilized for irrigation by the local ranchers. As a result of increasing concerns over present and future water use conflicts, which have been expressed by local ranchers and various government agencies, including the Department, the B.C. Ministry of Environment has initiated a planning study which will lead to the eventual development of a watershed management plan for the Nicola Basin. An integral component of this plan will be the provision of water for fisheries purposes.

In 1980, the Division initiated a study of the Nicola and Coldwater Rivers to determine fish requirements for salmon spawning and rearing in the system. The collection of physical, biological and hydrologic data will continue in 1981 and resource maintenance flow recommendations for the mainstem Nicola and Coldwater Rivers should be available by the end of the year.

g) Englishman River

In response to a water licence application by the town of Parksville to withdraw 6.8 million litres per day from the Englishman River, a study was initiated in the summer of 1979. Hydrological, physical and biological data were collected to establish the flow requirements to maintain viable chum and coho salmon populations in the system. The Englishman River, like most southeastern Vancouver Island streams, is characterized by severely low discharges for protracted periods in the summer months. Accordingly, it was recommended that headwater storage be developed to fully support the proposed water licence during the low flow period. Parksville has agreed to this requirement.

h) Seton Creek Hydroelectric Facilities

The Seton Creek powerplant, which became operational in 1956, is located on the right bank of the Fraser River approximately one kilometre downstream from the mouth of the Seton Creek. Water is conveyed to the powerplant 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 powerplant for substantial periods of time. While this problem was anticipated during the design stage of the project, it was not known how serious it would be. The Department allowed the project to proceed with the understanding that steps would be taken to mitigate any serious problems resulting from a migration delay.

Studies undertaken in 1956 and 1957 did not reveal any serious effects of the hydroelectric plant on migrating adult salmon. However, a serious problem was observed in 1972 when lower than expected numbers of Gates Creek sockeye reached the spawning grounds and sockeye in the Seton-Anderson system exhibited a high incidence of head injury. These head injuries were later found to occur in the draft tube of the powerplant.

A number of methods of mitigating the problem have been tried on an experimental basis since 1972. 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 during 1979 and 1980 revealed that adding Cayoosh Creek water into the powerplant supply makes this route less attractive to migrating adults. On the basis of these studies, negotiations are underway with B.C. Hydro to construct permanent mitigating facilities.

Foreshore Management

The Foreshore Management Section is primarily involved in the review of port and marina developments and construction proposals, foreshore real estate development proposals, and log storage proposals for estuarine areas

as they relate to preservation and protection of productive fish habitats. Because of the interrelationships between the control of land use related activities on the part of the provincial government and the preservation of productive fish habitats on the part of the federal government, the Unit is often called upon to represent the Department on various foreshore management and planning task forces and studies. These activities are the single most time-consuming activity in the Foreshore Management Section.

a) Roberts Bank Superport

For the past decade, the National Harbors Board in Vancouver has proposed major expansion of port facilities at Roberts Bank adjacent to the Fraser River estuary. The most recent proposal for a fivefold expansion of these facilities resulted in a public hearing conducted under the framework of the Environmental Assessment and Review Process (EARP). The Department successfully defended the position that an expansion of that scale was unwarranted and unacceptable. The EARP panel subsequently recommended that a much reduced expansion should proceed. An Environmental Review Committee, including Department representatives, was established to advise the National Harbors Board on environmental matters arising from construction of port facilities.

b) Kitimat Harbor

A master plan study prepared for the British Columbia Harbors Board has been reviewed in the context of the known significance of the Kitimat River estuary to salmon production. The master plan called for development of Kitimat as an oil port, industrial terminal (in addition to Alcan's facilities), bulk terminal, forest products terminal, general cargo terminal, ferry and rail car terminal and roll-on roll-off barge terminal. While many of these facilities could be constructed in that portion of the estuary which has already been alienated and degraded by the installation of the aluminum smelter and the forest products terminal, the proposal entailed the destruction of 80 ha of prime habitat in the eastern two thirds of the estuary. Biological assessment of this area indicated that only a narrow strip sufficient to accomodate ferry slips could be constructed without endangering critically productive areas.

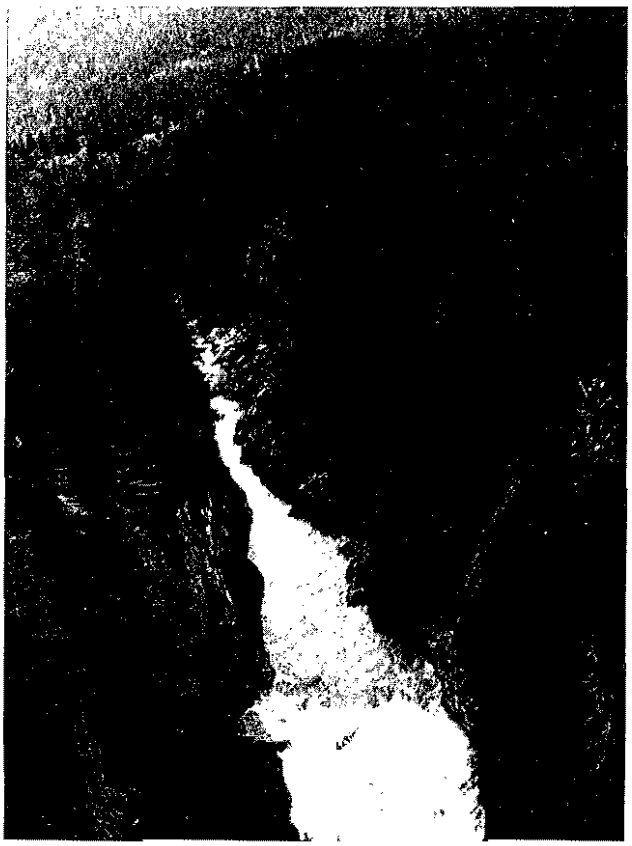
c) Stewart Harbor

A master plan for the Port of Stewart, prepared for the B.C. Harbors Board, was reviewed in the context of the known and estimated biological significance of the combined Bear and Salmon River estuaries. It was concluded that development of port facilities should emphasize the northeastern area of the Bear River estuary and that the remaining undeveloped areas should remain in that state. Subsequent proposals by Cassiar Asbestos for installation of a barge terminal at Stewart were reviewed and approved in accordance with this assessment.

d) Cowichan Estuary Task Force

In 1974, the Environment and Land Use Committee (ELUC), a committee of the provincial cabinet, adopted a "maintaining the status quo" position and stated that "...no major expansion of industry will be permitted in the estuary." This concept was later adopted as a policy by local planning authorities. Despite this policy, several forest products companies advanced proposals to develop new or expand existing operations in the estuary, including one which, despite formal commitments to the effect that only 10 ha of estuarine log storage would be required to modernize their operation, had expanded its log storage to ten times the original approved allocation. Together with other factors, these requests prompted the local planning authorities to formally request that the Province enact legislation making the 1974 "status quo" policy legally binding. The ELUC decided that such legislation would not be in the

best interests of either the province or the estuary, and instead authorized the reconvening of the Cowichan Estuary Task Force for the purpose of reviewing proposals for development on the estuary.



Proposed B.C. Hydro Damsite No. 2 on the Iskut River.

Since the first meeting of the reconvened Task Force held in January 1978, representatives of Habitat Protection have worked in committee and working groups to prepare a report which represents information on the current status of estuarine resources, their uses, values, and the impacts they have sustained, and to present a plan for the use and management of the lands and water of the estuary.

In November 1980, the final report of the Task Force was released. Among other things, the report recommends the adoption of a land use plan for the estuary. The land use plan places major emphasis on the preservation of the natural values of the Cowichan estuary, while recognizing the potential needs of existing industry and for future development by industry and the community. It reflects the Department's position respecting the preservation and restoration of productive fish habitat while providing for an upland zone adjacent to the intertidal area in which development options are restricted to those which can be shown to be compatible with fisheries resource values. The plan identifies limited expansion opportunities for existing industry and provides that an assessment process be applied to new proposals that establish need, net benefit, and the absence of technological or site alternatives. In addition, the plan recommends major changes to the current pattern of log storage and handling operations on the estuary.

In summary, the plan concept is good, supportive of fisheries interests and policy, incorporates acceptable elements of flexibility, and assures full federal/provincial assessment of future development proposals. Habitat Protection staff, in conjunction with provincial agency staff, are presently implementing the recommendations of the report.

e) Nanaimo Estuary and Log Management Task Force

In 1977, the British Columbia Development Corporation advanced a proposal to develop a port and forest products complex on Duke Point, adjacent to the Nanaimo River estuary. The proposal entailed the development of several sawmills or a combination of sawmills and a thermomechanical pulpmill as well as major port facilities on a site which was originally recommended as an acceptable port alternative by this Department.

While there was no real difficulty in accepting the site chosen for devel-

opment, the Department opposed any further increases in log storage in the estuary. At the request of the Minister, a federal/provincial Task Force was established to examine the log storage requirements for Nanaimo-based sawmills and determine the feasibility of developing log storage space and log handling procedures which would ensure reduction rather than an increase of the estuarine areas committed to log storage. In October 1980, the Task Force identified a log storage option that will accommodate the additional industrial demands, while at the same time will permit a substantial reduction in the areas affected by log storage and transport activities. At the time of this writing, implementation of this option was nearing completion.

f) Squamish

In 1972, development of a forest products terminal, dredging of the delta and construction of river training walls resulted in the permanent loss of approximately 40 ha of productive foreshore estuarine areas. Continuing through the mid-seventies there was substantial additional development proposed to further expand the deep-sea port. In 1977, Squamish Terminals Ltd. announced a proposal to construct a second berth, requiring dredging and landfill of some 10 ha in an area of the delta known to be highly productive fish habitat. In response to this recent proposal, the Minister's position has been that no further loss of these productive areas should be permitted.

Most recently, the Minister of Fisheries and Oceans and the provincial Minister of Environment, in recognizing the sensitivity of the estuary, and in response to existing land use conflicts, established a planning process designed to develop a land use plan for the Squamish estuary. Habitat Protection staff provide advice with respect to the definition of estuarine areas suitable for preservation, industrial or commercial development, and mixed use. The land use plan, when completed, shall incorporate a specific process for resolving conflicts over designated use and for making incremental adjustments and refinements in use designations. A final Squamish Estuary Management Plan is scheduled to be completed by December 1981.

g) Campbell River

Several years ago, the Campbell River Indian band proposed construction of a marina on Indian reserve lands in the estuary. The Department, since this predated revisions to the Fisheries Act, offered to compensate the Band for non-use of the estuary by way of providing for an alternative marina site outside the estuary. The alternative marina, which would be for commercial and recreational fishermen's use, is to be developed under the auspices of the Small Craft Harbors Branch. Negotiations are underway with the Band to establish the values foregone associated with non-use of their property.

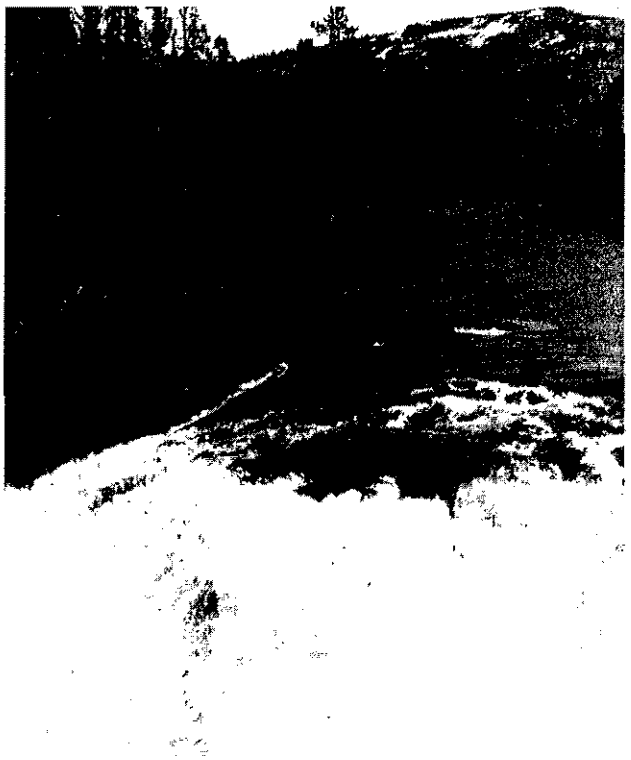
h) Real Estate Development

The greatest single threat to the preservation of highly productive intertidal foreshore and estuarine land is the development of industrial, commercial and residential property with direct access to shipping channels or the sea. Although British Columbia has a very long shoreline, the areas amenable to such development are confined to estuarine areas and a relatively few isolated marine foreshore areas with developable shelf zones. Interest in these areas is enhanced by the fact that they are very easily developed and serviced at a comparatively small cost. As a consequence, several hundred development proposals involving filling and dredging are reviewed in order to assure that productive fish habitats are not alienated. In addition, the Department is now being asked to provide advice to realtors dealing in such properties concerning the Department's attitude towards the type of use to which the property may be

put. This is the direct result of the new habitat protection clauses in the Fisheries Act. Some of the more interesting development proposals are described below:

- Englishman River: Several years ago a developer acquired a substantial tract of land adjacent to the estuary of the Englishman River. In an attempt to protect his land fronting on one of the tidal river channels, he illogically dyked off the channel and diminished the areas as productive intertidal salmon habitat. When the property changed hands, the new owner concurred with the view that the dyke served no useful purpose. The dykes were breached using Salmonid Enhancement Program funds and the area is now naturally recovering as useful fish habitat.

- Campbell River: When the Campbell River Estuary Task Force failed to secure political support for its recommendations to relocate the sawmilling and log storage operations away from the estuary, a program was developed to investigate and assess mitigation opportunities to reduce the impacts of log storage on the estuary. A report providing the basis for future land/water use decisions is to be completed by April 1981.



These falls on the Nanika River would be flooded out by Alcan's proposed Kemano Completion Project.

Contact: Rod Bell-Irving, Chief,
Water Use Unit.

Management Services

Several key staff and organizational changes during 1980 affected the continuity of programs carried out under the Management Services Division.

The Staff Training and Career Development position was filled in September. Fourteen fishery officers were recruited and a new informal training program was established using instructors from within the Department. These training programs will be available in one or two week modules and will provide staff with the opportunity to pick up skills unavailable from outside training courses.

The position of Indian Advisor was filled in August. The role will be to maintain close, ongoing contacts with native groups and organizations in order to advise both senior headquarters staff and division heads of the perceptions, concerns and aspirations of native people in respect to the Indian food fishery, Indian licencing programs, Indian assistance programs and native employment opportunities. The position is strictly supportive in nature and will not interfere in local

fish management issues beyond fact finding, unless sought out by division staff.

The Regulations Unit attempted to bring some order into the process of changing regulations. A schedule of deadlines was set out which will allow ample time for the passage of regulation changes before the commencement of a particular fishery. It should also reduce the problem of having last minute "emergency" changes sent to Ottawa for preferential treatment. With the rapidity of change in the fisheries, it is now a constant workload to keep pace with developments.

With the decentralization of regional headquarters, part of the Investigations Unit will be decentralized in 1981. This change is expected to result in closer involvement of Divisions in investigative work and a focus on intelligence reporting by the regional headquarters core unit.

The Licencing Unit administrative function was reviewed in 1979/80, and a report completed by the spring. "On-line" processing of licence data was strongly recommended in order to make the information more accessible and the processing activity more efficient and compatible with decentralized operations. These changes are currently under review.

Contact: Al Gibson, Chief,
Management Services Division.

Recreational Fisheries Advisor

The position of recreational (sport) fisheries advisor was established early in 1979 on a contract basis for an indefinite period. The advisor's terms of reference are twofold: on the one hand, the advisor is to assess trends in sport fishing, which has become a "mushrooming" activity-industry. On the other hand, the advisor acts as an ombudsman for the sport fisherman.

Trends in sport fishing and the allocation of a share of the resource to the angler and tourist have been noted and assessed. The sport fish advisor was involved in the discussions over proposed fishery regulations, and worked closely with the Information Branch and the Operations Room, through which most fishing reports are funnelled.

One duty of the sport fish advisor is to keep close contact with the larger organized groups of sportsmen, such as the B.C. Wildlife Federation, the Steelhead Society of B.C., the smaller Pacific Salmon Society, the B.C. Federation of Flyfishers and the budding charter-boat organizations.

In this second year, 40 public appearances were made before angling clubs, service clubs, fishing guides' meetings, public protest meetings, at conventions, Salmonid Enhancement Task Group meetings, sport fish advisory group meetings, radio talk shows and a TV talk show.

Ten regional conferences of sportsmen groups and fishery resource agents were attended, at which an opportunity was found to assess the management of sport fisheries elsewhere and hear points of view of anglers and guides in other regions.

Contact: Lee Straight,
Recreational Fisheries Advisor

Training & Career Development

The Training and Career Development Unit is charged with developing courses and training to improve the resource management skills of all staff.

The Unit this year received fourteen fishery officer recruits for training: four were taken on strength in June and the remaining ten in October. The recruits received one week of orientation and then received assignments to sub-

districts with the understanding that they would be put on various courses throughout their training year.

Courses which were developed or co-ordinated this year include:

- senior police administrative course
- instructional techniques
- training material for Marine Radio Operators Ticket (exam yet to be scheduled)
- herring sounder/sonar course
- RCMP enforcement course held in April-May, 1980 for 28 fishery officers
- resource harvesting workshop involving the fishing and logging industries as well as Department staff
- habitat protection session on policy guidelines and how they relate to the field
- basic and instructor level First Aid Courses
- guidelines and parameters for use in stock management
- stock management techniques.

The Unit also serves as the Field Services representative on college and university advisory boards, and evaluates training proposals submitted by industry.

Contact: Brian Richman,
Branch Training and Career Development Officer.

Regulations

The Regulations Unit maintains regulations governing the various fisheries in keeping with the changing conditions and circumstances of the fisheries. It also monitors enforcement/court proceedings, and provides legal advice and assistance to the field officers in their enforcement activities.

There were 1,059 charges laid in the Province in 1980, a 20 percent decrease over the 1979 total.

In 1980, the following regulations were amended to keep abreast of the various fisheries:

- B.C. General Regulations
- Pacific Commercial Salmon Fishery Regulations
- Pacific Shellfish Regulations
- Pacific Herring Fishery Regulations
- Pacific Fishery Registration and Licencing Regulations.

In total, 16 sets of amendments were drafted for enactment into law by Order-In-Council.

It is hoped that the long-awaited ticket system for minor offences will be in place by late spring or early summer 1981.

The "Micom" computer has proven invaluable for completing and maintaining prosecution records. It is also ideally suited to the preparation of regulation drafts. The "Micom" has now been equipped with communication equipment, allowing almost instant transmission of documents back and forth to Ottawa.

Contact: Mel Hart, Chief,
Regulations Unit.

General Investigations

Early in 1980, each of the three management divisions selected three or four targets for the GIU to investigate, on an as requested basis.

Most of the work was done for the Fraser River-Northern B.C. and Yukon Division, and two minor investigations and some assistance were provided for the South Coast Division.

The investigations conducted for the Fraser River-Northern B.C. and Yukon group were covert in nature. Because of the nature of these operations, and the fact that they are not complete, they cannot yet be reported on.

Table 59

1980 Prosecutions

Prosecutions by Statute	Total
Fisheries Act (general)	83
Fisheries Act (habitat related)	24
Coastal Fisheries Protection Act	13
B.C. (General) Regulations	387
Salmon Regulations	90
Herring Regulations	24
Licencing Regulations	114
Shellfish Regulations	294
Other Regulations	30
Total	1,059

Table 60

1980 GIU Activities by Type

Type	Number
Investigations	129
Prosecutions	11
Waivers	31
Warrants and Summons	19
Dept. of Justice Investigations (suits, etc.)	4
Total	194

Following up on some of the 1979 investigations:

- two convictions were registered against individuals attempting to export or sell "gow"; in addition to fines, some 2,267 kg net weight of product was forfeited to the Crown
- another case involving a large seizure of gow has gone to trial but has not been adjudicated because of the defendent's tactics
- a case involving illegal halibut fishing will be heard in early 1981
- assistance provided to Victoria led to the conviction of a person selling sport-caught fish to a commercial processor.

In 1981, the GIU will be decentralized.

ORR/Zenith Program

(Zenith 2235)

The program established in 1979 was carried on in 1980. The B.C. Wildlife Federation was awarded a contract to provide radio operators. This provided some continuity in manning the radio.

Contact: Tom Moojalsky,
Chief Enforcement Officer.

Table 61

Complaints Received via ORR/ZENITH

Responsible Agency	Number
Department of Fisheries & Oceans	293
Conservation Officer Service	154
Other	14
Total	461

Licencing

The Licence Section issues licences to all commercial fishing vessels, commercial fishermen and nonresident anglers.

Special permits to commercial and sport fishermen are also issued as required. These permits and licences cover areas of federal jurisdiction. (The provincial government administers licences required for sport fishing in fresh water.)

The Licence Section distributes significant data related to the various licence programs, to other government departments, the general public and

Table 62

1980 Vessel Licences

Designation	Licence	Number Issued	Licence Value	Total Value
A	Salmon (vessels under 30')	265	$ 100	$ 26,500
A	Salmon (vessels 30' and over)	3,371	200	674,200
A	Salmon (over 15 tons)	529	400	211,600
A1	Salmon (owned by Indians paying reduced fees)	378	10	3,780
B	Salmon (10 years only)	286	10	2,860
C	Groundfish	1,054	10	10,540
D	Packer	192	10	1,920
E	Abalone	26	200	5,200
H	Roe Herring (non-Indian gillnet)	911	200	182,200
H	Roe Herring (non-Indian seine)	187	2,000	374,000
H	Roe Herring (Indian gillnet)	399	10	3,990
H	Roe Herring (Indian seine)	61	10	610
L	Halibut	440	10	4,440
S	Shrimp (by trawl)	244	10	2,440
T	Groundfish (by trawl)	146	10	1,460

members of the fishing industry.

The attempt to renew and issue all licence categories at the same time was unsuccessful. Delays in issuing licences and licence extensions caused confusion on the fishing grounds and in the office. New procedures are being investigated to eliminate this annual problem.

The "G" (geoduck) licence and "K" (blackcod) licence, which were to be implemented in 1980, were delayed. Both will be implemented in 1981.

On October 28, 1980, the Minister announced a fisheries management package for the west coast salmon resource. Among the highlights:

- Two Area Troll Licence Scheme: salmon trollers wishing to participate in salmon trolling in the inside of the Gulf of Georgia must indicate such on their 1981 licence renewal form. They will be issued special tabs and advised

Table 63

1980 Personal Commercial Fishing Licences

District	Number Issued
Vancouver	3,550
Kamloops	20
New Westminster	3,179
Nanaimo	3,529
Port Alberni	1,387
Campbell River	2,095
Victoria	3,700
Kitimat	423
Prince Rupert	2,069
Queen Charlotte City	585
Whitehorse	58
Total	20,595*

* value: $102,975.

of all requirements and restrictions regarding that fishery.

- all salmon licence fees will be doubled in 1981.

- annual personal commercial fishing licences will be $10 commencing in 1981.

- resident and nonresidents will require a personal sportfishing licence in 1981. Fees will be $3.50 for a day licence, $10 for a 3-day (nonresidents only) licence, $5 annual (resident) and $20 annual (nonresident) licence.

Responding to needs for information continues to be a major responsibility. Telephone inquiries come from members of the fishing industry, fishing associations, sport fishermen, lending institutions, lawyers, other government departments and the general public. Correspondance from these sources amounted to approximately 40 letters per day (not including renewal applications).

As the licence program continues to expand, development of new procedures and forms should help to make a more efficient and organized Licence Section.

Revenue collected in 1980 from the sale of commercial fishing licences (vessel and personal) and sportfishing licences (nonresident) amounted to approximatley $1.7 million.

Contact: Judy White, Supervisor,
Regional Licence Section.

Ship Division

Nationally, approximately 20 percent of the Department of Fisheries and Oceans' personnel are involved in the management and operation of ships. In the Pacific Region, the Ship Division (which is part of the Support Services Branch), is responsible for providing the Field Services Branch with the vessels and crews necessary for the effective management and enforcement of the Pacific coast fisheries.

The fleet consists of 32 patrol vessels ranging in size from 10-60 metres. The three headquarters' vessels, Fisheries Patrol Vessels HOWAY, LAURIER and TANU, perform their duties coast-wide, whilst the remainder of the fleet are assigned to individual districts and subdistricts on an "as required" basis.

In addition to the fleet of patrol vessels, Ship Division is responsible for the management and operation of the Fisheries Research Vessels G.B. REED and CALIGUS based at the Pacific Biological Station, Nanaimo.

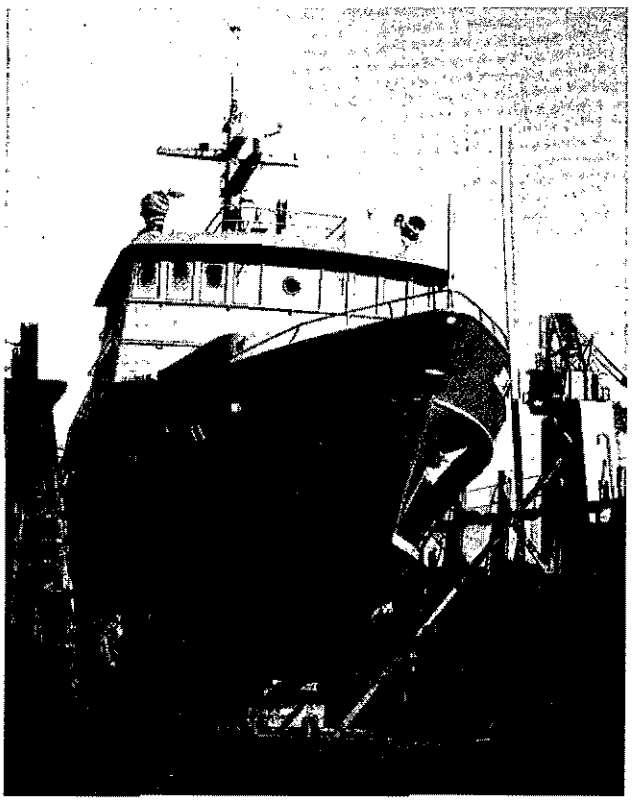
Major Refit

The FPV LAURIER underwent a major electrical refit this year. Two new alternating current (A.C.) ship's service generators were fitted and the entire vessel was rewired for A.C. only. This and other work carried out in the shipyard has greatly improved the overall operational safety and efficiency of this 45-year-old vessel.

FPV JAMES SINCLAIR

Construction continued on the new patrol vessel which is to replace FPV HOWAY. The vessel was launched on October 29, 1980 and completion is scheduled for May 1981.

This vessel, 37.8 m overall length and of all aluminum construction, will have a maximum speed of 17 knots fully



FPV James Sinclair under construction, February 1981.

loaded and is equipped with state of the art navigational, fish finding and engine room monitoring systems.

Search and Rescue (SAR)

In addition to their fishery patrol duties, five patrol vessels (TANU, LAURIER, ARROW POST, CHILCO POST and KITIMAT II) were again multi-tasked to Fisheries/SAR duties. The five vessels responded to a total of 142 incidents; 75 incidents were handled by the remainder of the fleet.

Table 64

1980 SAR Incidents Responded to by Fisheries Patrol Vessels

	Multi-tasked Vessels	Fisheries Only Vessels
Fire	10	1
Disabled	51	44
Sinkings	21	5
Overdue	12	5
Aground	12	7
Medical	12	5
Overboard	3	1
Misc	21	7
Total	142	75

1980 Total: 217
1978 Total: 141
1979 Total: 228

Surveillance Duties

A total of 649 domestic and 84 foreign vessel boardings were conducted by the three headquarters vessels and the Nanaimo District vessel FPV ATLIN POST.

Contact: Captain Gordon Irving, Chief, Ship Division.

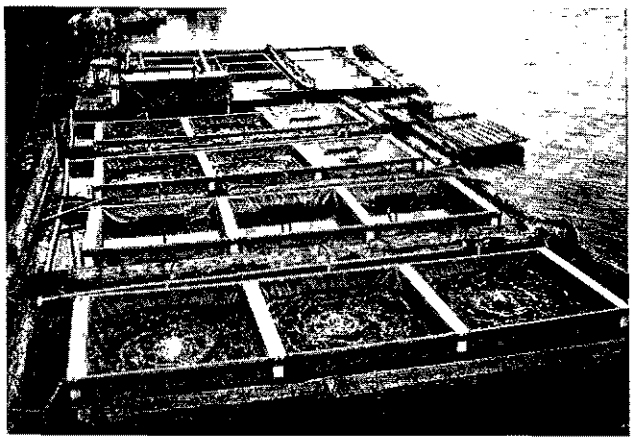
Fisheries Development

The Fisheries Development Division works with fishermen, industry representatives amd other government agencies on programs for the development of the commercial fisheries in the Pacific Region.

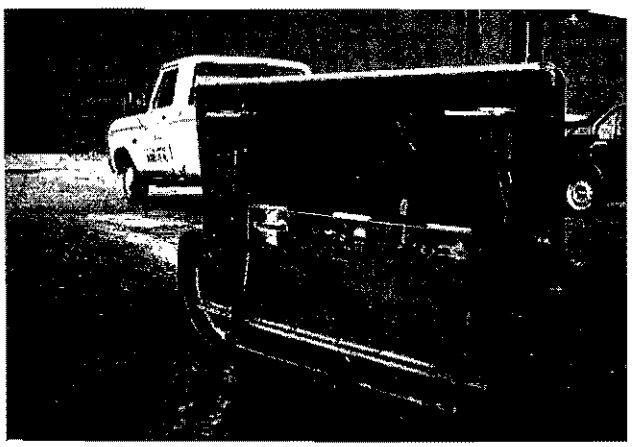
Projects are undertaken to:

- more efficiently exploit fishery resources with emphasis on improved catch selectivity by species and size
- explore and develop new fishery resources and new fisheries
- introduce and demonstrate to fish-

ermen new types of fishing equipment and new fishing techniques
- develop new fishery products
- improve the handling, processing and quality of fish and fishery products.



Experimental floating culture system for seaweeds.



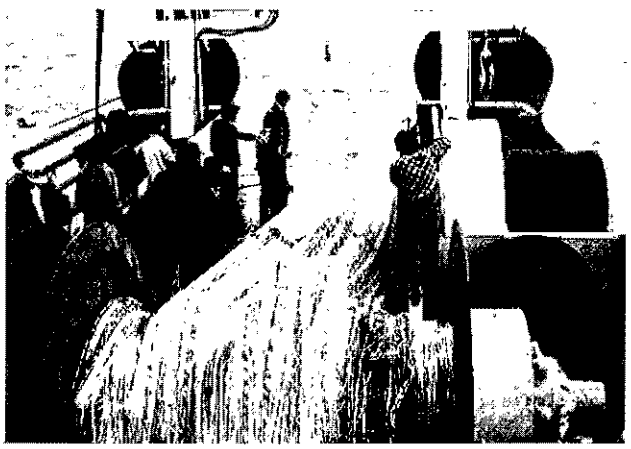
Small aluminum V-type trawl door for inshore trawlers.

Projects carried out under the Fisheries Development Program over the past years have ranged from the introduction of midwater trawling to the development of a synthetic cultch (oysterbed) for oysters.

Projects in 1980 included:
- fishing gear development
- blackcod trap escape mechanism
- cod-end mesh selectivity
- exploratory fishing for dover sole
- exploratory and demonstration fishing for squid
- exploratory fishing, sea mounts, automated longline
- demonstration fishery, herring impoundment
- live storage and depuration (purification), shellfish
- Pacific hake roe and flesh quality
- publication of pamphlet **Freezing at Sea**
- fishermen's safety manual
- development of synthetic oyster cultch
- demonstration mussel culture project
- demonstration commercial mussel culture project.

Synthetic oyster cultch in vexar bag, ready for stringing.

Fishing gear projects have included further development work on a combination bottom/midwater trawl door, the construction of a small aluminum V-type door for inshore vessels, and evaluation of a small vessel automated longline system being developed by a local firm.



Midwater trawling trials of the MV Arctic Harvester.

Several gear development and exploratory fishing projects were carried out in collaboration with the Resource Services Branch. A project to develop a positive escape mechanism for lost blackcod traps demonstrated that the most reliable method remains to be the use of cotton twine to lace in an escape panel. Rings laced into a number of traps provided some selectivity in areas where juvenile concentrations were high. A cod-end mesh selectivity project, carried out on English and rock sole in the Hecate Strait area, using 4¼", 5¼" and 6" meshes, demonstrated that the 6" mesh size captured 1/3 as many fish that would normally be discarded using 4¼" meshes.

Two projects, one on Pacific hake roe and flesh quality, and another on the live depuration and storage of shellfish, are currently being carried out in collaboration with the Technology Branch.

A program to evaluate the impoundment of herring as a means of lengthening the roe herring fishing season, reducing the heavy fishing on spawning grounds, improving product quality and increasing product diversification, was commenced in 1980 with involvement by both the Department and industry. A core research project was started at the Pacific Biological Station and a number of industry projects were planned for the 1981 roe herring season. An industry report will be available in early June 1981. A pamphlet entitled **Principles of Handling Salmon on Freezer Vessels** was published by the Fisheries Development Program. Financial support was also provided for the publication of the **Fishermen's Safety Manual**, prepared by the Joint Fishing Industry Safety and Health Committee.

In addition to project work, the Division provided technical advice to other Branches and Divisions of the Department, other government agencies and the fishing industry.

Contact: Bob McIlwaine, Chief,
Fisheries Development Division.

Headquarters Support

Herring Coordinator

The Regional Herring Coordination Centre was established three years ago to act as a focal point for matters concerning the management of the B.C. herring resource. Its main function is to draw together all of the complex components that make up the management

and research associated with the herring resource. It provides a vehicle whereby diverse concerns such as biological stock assessment, on-the-grounds management, enforcement, licencing, economic, social and marketing factors can be considered in relationship to each other and a rational approach toward management of the resource can be achieved.

Of continuing concern has been product and market diversification for herring. The Herring Coordination Centre reviews the food and bait herring fishery for ways of improving harvest and product handling techniques. In addition, in conjunction with Fisheries Development, the Centre has launched an experimental commercial pilot project to determine the feasibility of producing high quality whole frozen roe herring in consumer-size packages for export.

Faced with limited resources for management, and a very large and efficient fleet size, plans were developed, in consultation with industry, for an area licencing system for the 1981 roe herring season. The effectiveness of the area licencing system in alleviating management problems will be analyzed and reviewed with industry immediately following the 1981 fishery.

Contact: Bob Humphreys,
Herring Coordinator.

Licence Appeals

The Licence Appeal Committee interviews several hundred fishermen in the course of a year, so it serves not only as an appeal process, but also a public relations role. The Licence Appeal Committee's main function is to review the licencing procedure to assure that regulations and guidelines are met. Appeals involving relatively minor exceptions to the regulations are frequently approved. Major appeals, unless there are extenuating circumstances, are invariably refused by the Licence Appeal Committee, and the appellants referred to the Ministerial Licence Appeal Board.

In 1980, a total of 844 appeals were directed to the Licence Appeal Committee; 333 were approved, 431 were denied, 13 were approved on a temporary basis and 67 were deferred for a later decision, pending receipt of additional information. Temporary approvals are given in an emergency situation such as the temporary replacement of a vessel lost by fire or sinking, while the appellant is having a replacement vessel built.

The majority of licence appeals involve "A" or "B" (salmon) licenced vessels, on replacement privilege as restricted by length and tonnage guidelines. However, as more fisheries are subjected to a limited entry policy, more appeals are generated.

In June 1980, the Licence Appeal Committee function was limited and discretionary powers were greatly restricted. This resulted from a federal court ruling in Victoria on a halibut licence appeal that questioned the Minister's exercising discretion in granting licences under circumstances that contravene existing regulations. Subsequent amendments to the Pacific Fishery Registration and Licencing Regulations have restored much of the Minister's challenged discretionary power.

The workload of the Licence Appeal Committee was greatly reduced during the summer of 1980, by extending the deadline for renewal of 1980 licences from May 31 to August 31. This, in one stroke, validated in excess of 200 late licence applications, all of which would have been submitted to the Licence Appeal Committee for adjudication.

Contact: Wendy Grider,
Licence Appeals Officer.

Salmon Services Unit

The Salmon Services and Special Projects Unit was transferred to the Field Services Branch from the Resource Services Branch in 1980. The Unit acts in a service function by carrying out the province-wide coded-wire tag Head Recovery Program and operating an aging service (regional Scale Lab) as well as a number of other special projects.

Contact: Don Bailey, Chief,
Salmon Services.

Head Recovery Program

The Head Recovery Program is carried out under contract to a biological consultant, J.E. Sager and Associates, and is funded jointly by the Salmonid Enhancement Program (SEP) and Field Services (FSB). The program samples commercial and sport fishery catches of chinook, coho and steelhead for missing adipose fins (the small fleshy fin ahead of the tail fin).

The commercial catch is sampled at processing plants at six locations--Prince Rupert, Namu, Tofino, Ucluelet, Victoria, Vancouver and Steveston--and attempts to sample 20 percent of the commercial troll and net catch for marked fish. In 1980, a total of 1.3 million salmon were checked for marks; 30,600 were found, and the heads or snouts containing the tags were removed and sent to the dissection lab.

The voluntary sport recovery program operates through 150 depots at various locations--marinas, boat docks and Fisheries offices throughout the B.C. coast. Sport fishermen are asked to turn in the heads of adipose clipped fish and fill out a tag label with capture information. In 1980, 9,750 heads were delivered to the dissection lab. Most heads are returned from Statistical Areas 13 (Campbell River), 14 (Qualicum-Comox), 16 (Texada Island), 17 (Nanaimo), and 28 (Howe Sound).

Fishermen receive information on the origin of their fish, a SEP button, the **Salmonid** newsletter and other Fisheries material. Sport fishermen are also eligible for one of eight annual bonus draws for one $500 prize and six $50 prizes.

The Head Dissection Lab in North Vancouver dissects the heads and removes the minute 1.0 mm magnetic tags with the aid of a magnetic detector and decodes the tag under a microscope. A video camera, microscope and monitor were purchased in 1981 and should aid in the decoding of tags.

In 1980, a new system of on-line data entry and editing (CICS) was instituted which should substantially improve the timeliness and accuracy of data processing.

Data on timing and migration routes of tagged hatchery and wild salmonid stocks are crucial to fisheries management and enhancement planning and evaluation. Estimates of the proportion of catch by stock origin is also very important in the Canada-U.S. International salmon negotiations.

The Head Recovery Program also has a sport and commercial logbook program which supplies information on specific catch location and marked/unmarked ratios not available by other means. The program also samples salmonids for biological information such as age and size, and samples chum salmon for other fin clips in addition to the adipose clip.

The Salmon Services Unit also purchases coded-wire tags, Peterson disc tags, and Floy tags, coordinates coded-wire tag and fin clip recovery information with U.S. agencies, and processes recovery information on Floy and

disc tags.

Contact: Vic Palermo,
Biometrician Programmer.

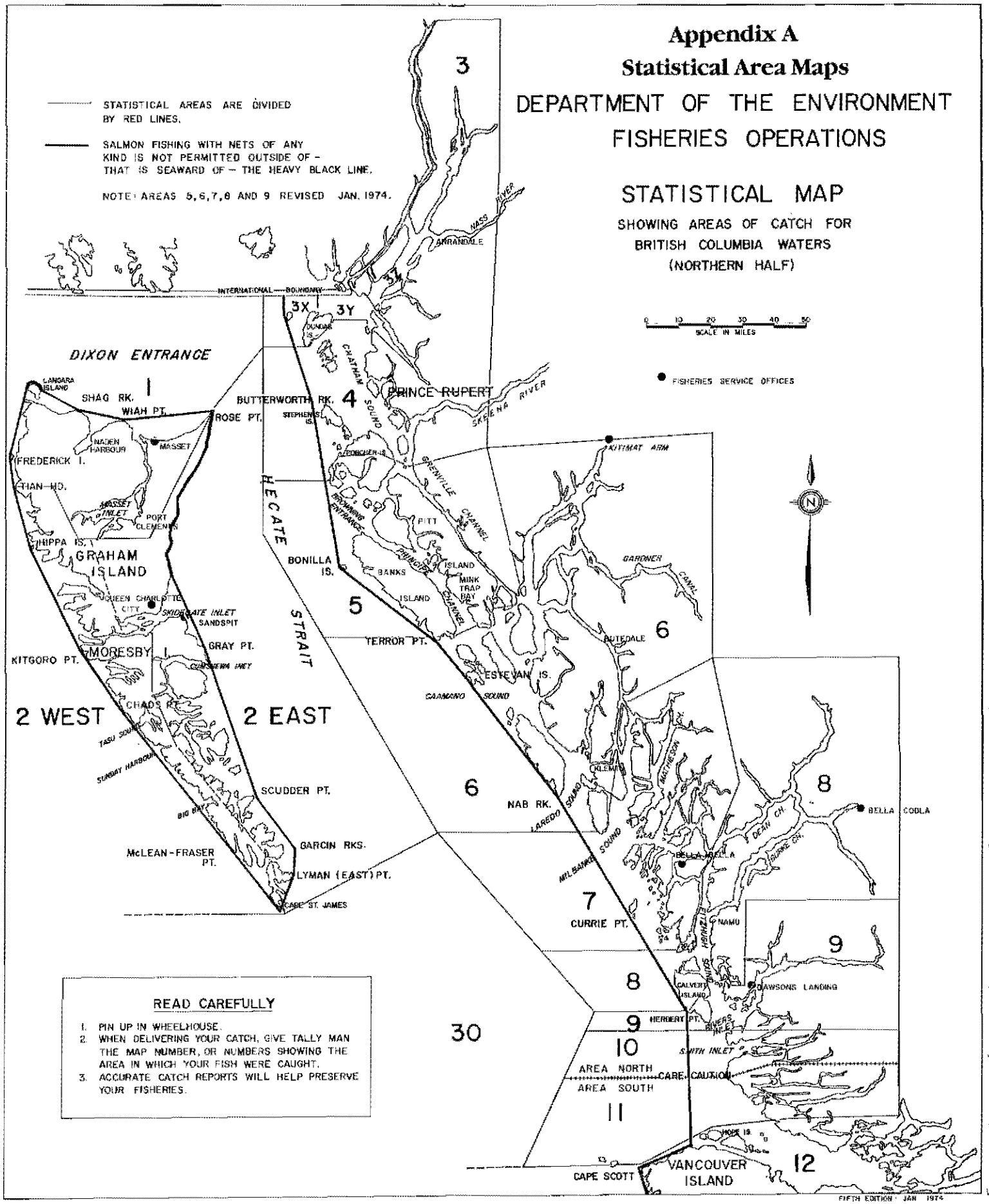
Scale Lab (Age Analysis Unit)

The Scale Lab is responsible for determining the ages of fish through examining scale, otolith and fin ray samples. Samples are obtained from adults and juveniles from all species of salmon, steelhead, trout, herring and freshwater species from all areas of the B.C. coast. In 1980, 192,000 scales were aged. Of these, 58 percent were for management of the fisheries, and 37 percent for the Salmonid Enhancement Program. In addition, 5,000 otoliths and 1,300 fin rays were aged. This represents an increase of 10 percent from 1979. Many of the scales were difficult to age chinook scales. A new "blue" information card was developed to collect geographical or ecological information to aid in more correct interpretation of scales.

Contact: Yvonne Yole, Supervisor,
Age Analysis Unit.

Appendices

Appendix A
Statistical Area Maps



DEPARTMENT OF THE ENVIRONMENT
FISHERIES OPERATIONS

STATISTICAL MAP

SHOWING AREAS OF CATCH FOR
BRITISH COLUMBIA WATERS
(SOUTHERN HALF)

READ CAREFULLY

1. PIN UP IN WHEELHOUSE.
2. WHEN DELIVERING YOUR CATCH, GIVE TALLY MAN THE MAP NUMBER, OR NUMBERS SHOWING THE AREA IN WHICH YOUR FISH WERE CAUGHT.
3. ACCURATE CATCH REPORTS WILL HELP PRESERVE YOUR FISHERIES.
4. FOR COMPLETE DETAILS, CONSULT BRITISH COLUMBIA FISHERIES REGULATIONS.

— STATISTICAL AREAS ARE DIVIDED BY RED LINES

— SALMON FISHING WITH NETS OF ANY KIND IS NOT PERMITTED OUTSIDE OF – THAT IS SEAWARD OF – THE HEAVY BLACK LINE.

● FISHERIES SERVICES OFFICES

0 10 20 30 40 50
SCALE IN MILES

CAPE SUTIL
CAPE SCOTT
CAPE RUSSELL
PORT HARDY
QUATSINO
ALERT BAY
KINGCOME INLET
KNIGHT INLET
JOHNSTONE STRAIT
BUTE INLET
TOBA INLET
27
QUATSINO SOUND
LAWN PT.
12
13
SEYMOUR NARROWS
CAMPBELL RIVER
15
JERVIS INLET
CAPE COOK
CLERKE PT.
KYUQUOT
KYUQUOT IS.
LOOKOUT IS.
26
LOOKOUT SOUND
KYUQUOT SOUND
TAHSIS
ESPERANZA INLET
FERRER PT.
NOOTKA
25
NOOTKA SOUND
ESCALANTE PT.
ESTEVAN PT.
RAFAEL PT.
24
CLAYOQUOT SOUND
TOFINO
COX PT.
COURTENAY
14
STRAIT OF GEORGIA
WESTVIEW
PENDER HARBOUR
16
SQUAMISH
HOWE SOUND
BECHEUT
28
HORSESHOE BAY
VANCOUVER
NEW WESTMINSTER
MISSION
STEVESTON
(SEE INSERT)
PARKSVILLE
PORT ALBERNI
NANAIMO
17
49°N
BRITISH COLUMBIA
U. S. A.
49°N
POINT ROBERTS
BLAINE
BELLINGHAM
KYUQUOT SOUND
ESTEVAN PT.
NOOTKA SOUND
ESPERANZA INLET
CLAYOQUOT SOUND
TOFINO
COX PT.
MUCHALAHT INLET
ALBERNI INLET
NITINAT LAKE
22
DUNCAN
18
SIDNEY
20
PORT SAN JUAN
BONILLA PT.
21
CAPE FLATTERY
SOOKE
BEECHEY HEAD
19
VICTORIA
STRAIT OF JUAN DE FUCA
23
BARKLEY SOUND
CAPE BEALE
PACHENA PT.
AMPHITRITE PT.

FOR ALL FISH CAUGHT OFF THE COAST OF THE STATE OF WASHINGTON SOUTH OF CAPE FLATTERY REPORT AS AREA "C"

INSERT MAP - FRASER RIVER

29-A
29-B
29-C
29-D
29-E
PT. GREY
PITT I. BRIDGE
FORT LANGLEY
MISSION
STEVESTON
JETTY
LIGHT SHIP
LADNER
BOUNDARY BAY
0 5 10 20
SCALE IN MILES

97

Appendix B
Key Field Services Branch Staff: Names and Telephone Numbers

DIRECTOR'S OFFICE, FIELD SERVICES BRANCH

A/Director	Don Wilson	666-1751
Program Planning and Evaluation	Frances Dickson	666-1519
Administration Officer	Pat Phillips	666-3284
Licence Appeals	Wendy Grider	666-3719
Herring Coordination Centre	Bob Humphreys	666-1207
Fisheries Development Division	Bob McIlwaine	666-2685
Fishermen's Newsletter and Information Officer	Kate Glover	666-1384

MANAGEMENT SERVICES DIVISION

Division Chief	Alan Gibson	666-1589
Recreational Fishing Advisor	Lee Straight	666-2768
Indian Liaison Officer	Dan Smith	666-2919
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	Judy White	666-3160

SOUTH COAST DIVISION

Division Chief, Nanaimo	Dennis Brock	734-4181
Senior Biologist, Nanaimo	Dave Schutz	753-4181
District Supervisors		
Port Alberni	Don McCulloch	724-0195
Nanaimo		753-4181
Campbell River	Norm Lemmen	287-2102
Victoria	Larry Duke	388-3252

FRASER RIVER, NORTHERN B.C. AND YUKON DIVISION

Division Chief	Fred Fraser	666-1287
Senior Biologist	Robin Harrison	666-2948
District Supervisors		
New Westminster		524-7181
Kamloops	Grant Scott	374-4322
Whitehorse	Gordon Zealand	403-667-2235

NORTH COAST DIVISION

A/Division Chief, Prince Rupert	Tom Perry	624-9137
Senior Biologist, Prince Rupert	Don Anderson	627-8730
District Supervisors		
Prince Rupert	Gus Jaltema	624-9137
Kitimat	Ed Christiansen	632-6158
Queen Charlotte	Kip Slater	559-4413

OFFSHORE DIVISION

Division Chief	Ed Zyblut	666-3167
Offshore Management Operations	Bob Wowchuk	666-1010
Commerce and Liaison	Trevor Proverbs	666-3991
Offshore Surveillance and		
Enforcement	John Cairns	666-1912
Operations Center	Suzanne Benoit	666-1583
Sport Fishing Information		666-3169
Commercial Openings and Closures		666-1583

INSPECTION DIVISION

A/Division Chief	Charles Campbell	666-1478
A/Operations Manager	Ian Devlin	666-1288
A/Engineering	Sing Liem	666-3342
Shellfish Coordinator	Sing Liem	666-3342
Boat Inspection		666-6746
Vancouver Laboratory		
326 Howe St.		
Bacteriological Unit	Nick Neufeld	666-1552
Chemistry	Tom Klopp	666-1554
Product Inspection	Wilf Gushue	666-6143

Northern Inspection District		
Prince Rupert		627-1375
Southern Inspection District		
Vancouver Lab.		666-3903
Vancouver Island District		
Victoria	Wayne Holmes	388-3455

FISHING VESSEL INSURANCE PROGRAM

Administrator	Audley Tinglin	666-3719
Chief Technical Advisor	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	666-3607

HABITAT MANAGEMENT

Division Chief	Forbes Boyd	666-3282
Planning & Coordination	Tom Bird	666-3166
Chief, Land Use Unit	John Payne	666-1356
Chief, Water Quality Unit	Mike Nassichuk	666-1280
Chief, Water Use Unit	Rod Bell-Irving	666-8667

Appendix C
Advisory Committees Sponsored by Field Services Branch

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

Terms of reference: to provide input into the management plan for the development and management of runs into the Skeena River.

Chairperson: Tom Perry, A/Chief, North Coast Division

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

*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: Tom Perry, A/Chief, North Coast Division

JOHNSTONE STRAIT 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.)

Chairperson: Dennis Brock, Chief, South Coast Division

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, Management Biologist

HERRING ADVISORY COMMITTEE

	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: Wayne Shinners, Director General, Pacific Region

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 licencing and fisheries management.

Chairperson: Ed Zyblut, Chief, Offshore Division

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

Terms of reference: to advise on all fisheries matters related to the Central Coast area.

Chairperson: Tom Perry, A/Chief, North Coast 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	3
B.C. Motel, Resorts and Trailer Parks Assoc.	1
Marina Operators	1
Charter Boat Operators	1
Tackle Manufacturers	1
General Tourism	1
Queen Charlotte Regional Representative	1
Sunshine Coast Regional Representative	1

Terms of reference: to advise on tidal and non-tidal sport fish matters and to assist in disseminating information to the general public on matters pertaining to these fisheries.

Chairperson: Colin Smith,
4125 Discovery Drive
Campbell River, B.C.
V9W 4X6

Appendix D
Publications List: FSB Reports Published in 1980.

HABITAT PROTECTION DIVISION

Hamilton, Roy E., Hydrology, Fisheries Resource and Watershed Development of Marble River, Vancouver Island, B.C.,
Fisheries and Marine Service Manuscript Report #1558, 1980.

Mathers, J.S., N.O. West and B. Burns, Aquatic and Wildlife Resources of Seven Yukon Streams Subject to Placer Mining, 100 pp, 1981.

Scrivener, J.C. and M.J. Brownlee, A Preliminary Analysis of the Quality of the Carnation Creek Spawning Gravels 1973-81, 32 pp, 1981.

Toews, D.A. and M.J. Brownlee, A Handbook for Fish Habitat Protection on Forest Lands in British Columbia, 200 pp, 1981.

OFFSHORE DIVISION

E.V.S. Consultants Ltd., 1980 Pacific Hake Observer Report, 1981.

FISHERIES DEVELOPMENT DIVISION

These publications and other pamphlets are available through the Fisheries Development Division, Department of Fisheries and Oceans, 1090 West Pender Street, Vancouver, B.C. V6E 2P1.

Davies, C. Ann, Principles for Handling Salmon on Freezer Vessels, 24 pp, 1980.

Stanley, R.D. and D. Davenport, A Trawl Selectivity Study of English Sole and Rock Sole in Hecate Strait, August 1-5, 1980,
Fisheries and Marine Services Manuscript Report, 1981.

Carter, E.W. and B.M. Leaman, Exploratory Fishing at Bowie Seamount by the Automated Longliner MV "Viking Star" August 28 - September 12, 1980,
Fisheries and Marine Service Manuscript Report, 1980.

Joint Fishing Industry Safety and Health Committee, Fishermen's Safety Manual,
Fisheries Association of B.C., 1981.