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ICNAF Subareas 1, 2, 3, 4 and 5

by

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Section I. Subareas 1, 2 and 3

by

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The following Laboratories of the Fisheries and Marine Service, Department of Environment conducted research in Subareas 1, 2 and 3 in 1974: Biological Station, St. John's, Newfoundland; Arctic Biological Station, Ste. Anne de Bellevue, Quebec; Marine Ecology Laboratory and Atlantic Oceanographic Laboratory, Dartmouth, Nova Scotia. Harp and hood seals in Subareas 2 and 3 are included in Section III.

Subarea 1

A. STATUS OF THE FISHERIES

No Canadian fishery.

B. SPECIAL RESEARCH STUDIES

2. Biological Studies

During July 29-August 15 the investigator-in-charge of Atlantic salmon investigations, Biological Station, St. John's, Newfoundland, joined a cruise of the Danish research vessel Adolf Jensen in West Greenland. Using drift-nets, 520 salmon were caught. St. John's staff shared in the sampling for length, weight, sex and maturity, scales, liver and blood specimens. The purpose of the program was: determination of size and age composition of Atlantic salmon in West Greenland during 1974, and comparison of results obtained from the discriminant analysis of scale characteristics and blood serum transferrin patterns for determining the relative proportions of North American and European salmon in the West Greenland area.

Subarea 2

A. STATUS OF THE FISHERIES

1. Cod

The catch from the Labrador coastal fishery was 1800 tons, a decline of 62% from the 1973 level and about the same as the 1972 catch. No catch was recorded offshore.

2. Greenland halibut

A small catch of 19 tons of Greenland halibut was also taken in the coastal fishery.

3. Atlantic salmon

The coastal fishery by set gillnets along the shore yielded a catch of 635 tons, an increase from 1973 (576 tons).

4. Other species

a) Herring. Herring landings decreased from 441 tons in 1973 to 11 tons in 1974, reflecting poor market conditions.

b) Mackerel. Landings dropped from 372 tons in 1973 to nil in 1974, again reflecting poor market conditions.

c) Capelin. Only 2 tons were landed by coastal fishermen in 1974.

B. SPECIAL RESEARCH STUDIES

1. Environmental Studies

a) Hydrography. The section off Seal Island, Labrador, was occupied in mid-August. Temperatures from surface to 10 metres were very similar to the average of recent years but considerably lower than those of 1973. The volume of water below 0°C associated with the Labrador Current was generally less and temperatures lower than the average, but similar to those encountered in recent years.

b) Other Environmental Studies. Bathymetric surveys for navigational charting were carried out by the Canadian Hydrographic Service along Newfoundland and Labrador coasts, including investigations of shoals and harbours.

Resource charting including bathymetry, gravity, magnetics and seismics along Labrador Shelf and Slope was conducted by the Canadian Hydrographic Service in cooperation with the Atlantic Geoscience Centre.

2. Biological Studies

a) Cod. Monitoring of the coastal fishery was continued in 1974. Catches were small. Water temperatures at the surface and at 50 metres were low. In the trap catches, the 1968 year-class was dominant while fish taken by gillnet were composed mainly of ages 8-14 years.

Two cruises were made to the area by the research ship A. T. Cameron, one in April and one in June. Fishing was restricted by the presence of ice and by stormy weather. Catches were quite small.

b) Redfish. Analysis of catch and effort statistics in Subarea 2 and Division 3K for the period 1958-73, and use of the Schaefer general production model to estimate levels of sustainable yield revealed that catch per unit of effort, catches and effort have been low since about 1966. Heavy fishing pressure in the early years of the fishery apparently reduced the stock to a level lower than that required to achieve equilibrium yield of 40,000-45,000 tons.

c) Atlantic salmon. During July 24-August 8, drift-net and set-net tagging experiments were attempted in northern Labrador; stormy weather and severe ice conditions seriously hampered fishing and tagging operations in this area. A total of 10 large salmon, 16 grilse and 10 Arctic char were tagged and liberated. All 3 recaptured large salmon were from the Labrador commercial fishery. Of 5 recaptured grilse all were from Labrador (3 from the coastal fishery and 2 from the Kenamu River).

d) Capelin. An acoustic survey of Hamilton Bank was conducted by the research vessel A. T. Cameron during October 1974. No significant quantities of capelin were recorded.

Subarea 3

A. STATUS OF THE FISHERIES

1. Cod

Total landings were 58.3 thousand tons, a decline of 18% from 1973. This was largely because of a decline in the inshore fishery, resulting in part from severe ice conditions in the northern divisions hampering the inshore fishery.

2. Redfish

The redfish catch was 8.0 thousand tons, a decline of 43% from 1973. About 5 thousand tons were taken in Division 3Ps and 2.6 thousand tons in Division 3Pn. Most of this decline was in the midwater trawl catches.

3. Flounders

These were again the principal species taken by the Canadian trawl fishery in Subarea 3 and also formed an important part of the coastal fisheries catches. Catches of American plaice totalled 41.2 thousand tons, a 14% decline from 1973. Yellowtail catches were 17.2 thousand tons, a 39% decline from 1973. Witch catches were 6.4 thousand tons, a 45% decline from 1973, and Greenland halibut catches, mainly from the coastal fisheries, were 5.9 thousand tons, a decline of 16% from 1973. These declines resulted from two general causes: a period during the summer months when the trawler fishery was suspended because of a strike and severe ice conditions in the northern divisions which hampered the inshore fishery. Additionally, yellowtail and, to a much lesser extent, plaice catch rates on the Grand Bank were lower in 1974, probably in part due to the unusually low water temperatures in the past couple of years but the heavy fishing in recent years may also have been a contributing factor.

4. Other groundfish

Catches of other groundfish totalled 4.5 thousand tons, the same as in 1973.

5. Atlantic salmon

The commercial fishery which is almost entirely by set gillnets along the shore yielded 1229 tons in 1974, a decrease from 1973 (1288 tons).

6. Herring

Herring catches remained stable at 18.3 thousand tons in 1974, barely 1/8 of the peak landings in 1969. This decline is associated with continuing poor recruitment to the southern Gulf of St. Lawrence herring stock which overwinters along southwest Newfoundland.

7. Mackerel

Mackerel catches in coastal fisheries decreased from 2335 tons in 1973 to 1842 tons in 1974.

8. Capelin

The capelin catch more than doubled to 15.2 thousand tons in 1974, representing significant increases in effort in both coastal and offshore fisheries.

9. Squid

Landings of Illex declined from 620 tons in 1973 to 17 tons in 1974.

10. Tuna

The sport fishery along the east coast of Newfoundland yielded 9 metric tons of bluefin tuna with 30 fish averaging 294 kg in weight.

B. SPECIAL RESEARCH STUDIES

1. Environmental Studies

a) Hydrography. In addition to a new section established off White Bay, Newfoundland, five standard sections were occupied during August 13-25.

Temperatures from surface to 10 metres were generally lower than the recent average and those of 1973. Temperatures in the intermediate layers and near bottom in the northern region were similar, higher in the central region and in the southern region somewhat similar to those of both the recent average and 1973 periods.

The volume of water, and temperatures less than $0^{o}C$, were similar over the whole area except for the northern region where temperatures were slightly higher than the average of recent years.

b) Other Environmental Studies. As part of a study of circulation and mixing between the Gulf Stream and continental slope, a current-metre study in the Laurentian fan area (boundary between Subareas 3 and 4) was carried out.

Ship time was provided to the Atlantic Geoscience Centre for seismic studies in the Newfoundland Basin and geophysical investigations including Baffin Bay.

2. Biological Studies

a) Cod. Monitoring of the coastal and offshore fisheries was continued in 1974. In the trap fishery, the dominant year-classes in Division 3K were those of 1969 and 1968, while in Divisions 3L and 3Ps, the 1969 and 1970 year-classes were strongest. In the other inshore gears, catches were composed mainly of cod of nine years or less. Catches by the offshore fleet were composed largely of fish of age six or younger. The dominant year-classes were those of 1968 and 1969. The charter of two Spanish pair trawlers by local industry for experimental work provided the opportunity to sample cod and other catches from these vessels.

As in recent years, cod catches by the A. T. Cameron on the Grand Bank in May were small due partly to the prevalent low water temperatures and to depressed stock because of heavy 1967-69 fishing. The best catches were taken in depths of 100-125 fathoms. On Burgeo and St. Pierre banks in April catches were small.

b) Haddock. Research cruises in 1974 once again indicated that haddock populations remained low; a cruise to Divisions 3L and 3N produced no haddock. In Division 3Ps the largest catch per one half-hour set was 43 kg (43 fish) with the total catch for the cruise (81 sets) being 224 fish. Thirty percent of the catch had lengths between 26 and 31 cm with the dominant year-class being 1972. No haddock caught in the inshore area were sampled as the fishery was small and of short duration.

c) Redfish. An evaluation of the status of Flemish Cap (3M) redfish utilizing the Schaefer general production and the Beverton-Holt yield per recruit models suggested that the high redfish catches of 1957-59 from this stock were above any sustainable yield level. The fishery was at a very low level during 1966-71. The maximum sustainable yield under equilibrium conditions was estimated to be less than half the 1972 catch of 42,000 tons.

A further assessment of Division 3P redfish on the basis of the Beverton-Holt yield per recruit model indicated a sustainable yield at the $F_{0.1}$ level of less than 24,000 tons at the recruitment levels prevailing during 1964-73.

A stratified-random bottom trawl survey at redfish depths in Division 3Ps with comparative day-night fishing revealed substantial differences in estimates of biomass and numbers derived from day and night bottom fishing. Eight- and nine-year-old fish were dominant in the 1974 survey. Long-term prospects for the period when these fish will enter the fishery are for a recruitment level substantially lower than that which supported the 3P fishery during 1965-73.

d) Flatfishes. Commercial sampling of all flatfish species was expanded and monthly sampling of the commercial offshore fleet for otoliths and length measurements was attempted.

New assessments were prepared for American plaice in Subarea 2 and Division 3K and witch in Divisions 2J-3KL. Total allowable catches (TAC's) of 8000 and 17,000 tons respectively were recommended as appropriate removal levels from these stocks pending the availability of more up to date information on exploitation rates. Assessments for American plaice, Divisions 3LNO, and yellowtail, Divisions 3LNO, were updated and 1975 TAC's recommended.

Groundfish surveys on the Grand Bank in 1974 indicated declines in abundance of plaice and yellowtail. The decline in the latter was particularly drastic in Division 3L with most strata indicating very low abundance levels, possibly because of the very low temperatures recorded.

Studies on fecundity of witch and food and feeding of yellowtail were in progress during 1974.

Comparison of growth curves of Grand Bank yellowtail with those reported from the Scotian Shelf and New England stocks indicates the former two to be similar. New England stocks are considerably larger at comparable age probably because of higher water temperatures in the latter area.

e) Atlantic salmon. During May 14-June 12, a drift-net tagging experiment was conducted in Conception Bay, eastern Newfoundland. A total of 137 large salmon and 23 grilse were tagged and liberated. Of 35 tags returned from recaptured large salmon, 20% were from Trinity Bay (i.e. migrating north), 37% from Conception Bay, 26% from southern Newfoundland, 11% from the Maritimes and 6% from Quebec. Of 7 tags returned from recaptured grilse, 29% were from Conception Bay, 29% from Newfoundland rivers (1 from Conne River and 1 from Humber River) and 43% from the Maritimes.

A program of commercial sampling was continued to provide quantitative descriptions on seasonal size and age patterns of salmon taken by commercial fisheries in various areas, in particular to allow estimation of one- and two-sea-winter salmon in catches and the variation in proportions with time.

f) Pink salmon. From a series of egg plantings during the early 1960's from British Columbia to North Harbour River, St. Mary's Bay, Newfoundland, a small stock of natural spawning fish was established. Returns from these fish are steadily declining. The total number reported in 1974 was 28 distributed as follows: 18 in North Harbour River, 5 in the

commercial fishery and 5 observed in other rivers. All returns were from St. Mary's Bay. These were the progeny of 58 adults which spawned in 1972 and a subsequent fry run of 37,000 during the spring of 1973.

g) Herring. The 1970 year-class of fall-spawners appears to be relatively strong in the southern Gulf of St. Lawrence herring stock complex which overwinters along southwest Newfoundland. It is not strong enough however to allow substantial recovery of stock biomass levels. Correlation analyses suggest that the presence of mackerel is depressing both the growth and recruitment of this stock and short-term prospects for its recovery are not optimistic.

In southeastern Newfoundland the 1972 year-class of spring-spawners contributed substantially to 1974 landings, arresting the decline in biomass levels in recent years.

h) Mackerel. The 1967 year-class continues to dominate mackerel catches in Subarea 3 with the 1971 year-class also contributing substantially. Continued recovery of tags from Subareas 4, 5 and 6 of mackerel tagged in Newfoundland coastal waters reinforce the hypothesis that the winter fishery in Subareas 5 and 6 depends at least partially and probably substantially on the so-called "northern contingent" of mackerel.

i) Capelin. Estimates of surplus production of capelin available to a fishery have been derived from a simple deterministic model based on predator dynamics. Such estimates indicate that yield levels up to 1 million tons may be sustained by capelin without severe detriment to its major predators.

j) Squid. Lower limits on annual production of Illex were estimated in the order of several hundred thousand tons based upon estimates of consumption of the species by pilot whales (Globicephala melaena).

3. Gear and Selectivity Studies

Nil.

4. Miscellaneous Studies

a) Toxicology of petroleum to fish. It was found that crude oil induces a class of liver enzymes in trout and capelin that may serve as an indicator of oil exposure in fish. Capelin eggs were found to be remarkably resistant to toxic effects of oil.

CANADIAN RESEARCH REPORT, 1974

SECTION II. SUBAREAS 4 and 5

by

J. S. Scott

Research in subareas 4 and 5 reported here was carried out by the Department of Environment Biological Stations, St. Andrews, New Brunswick, St. John's, Newfoundland, the Arctic Biological Station, Ste. Anne de Bellevue, Quebec, the Marine Ecology Laboratory, Dartmouth, Nova Scotia, the Bedford Institute of Oceanography, Dartmouth, Nova Scotia, and by the Quebec Ministry of Industry and Commerce.

Subarea 4

A. STATUS OF THE FISHERIES

1. Groundfish general

Total nominal catches (Maritimes and Quebec) decreased by 19% from those of 1973 to about 214,000 metric tons. Reduced landings of all major species except flatfishes contributed to the loss; the main reduction was in redfish which had boosted landings in 1973.

2. Cod

Landings (Maritimes and Quebec) were down 7% from the 1973 level but constituted 33% (71,000 metric tons) of the total groundfish landings as against 29% in 1973. Landings from all sectors of the Scotian Shelf (Divs. 4X-W, Subdiv. 4Vs) decreased while those from the Gulf of St. Lawrence and north Cape Breton (Divs. 4R-S-T, Subdiv. 4Vn) remained at about the same level as in 1973.

Newfoundland landings, mainly from the Gulf of St. Lawrence (Divs. 4R-S-T) again increased by about 11% to over 23,000 metric tons of which about 16,000 metric tons came from the northeast Gulf of St. Lawrence (Div. 4R).

3. Haddock

All haddock stocks were under quota control. Total landings decreased by 6% from 1973 level, mainly because of low returns from the middle of the Scotian Shelf (Div. 4W). Landings from the Browns Bank-Bay of Fundy area (Div. 4X) remained at about the same level as in 1973. Catches from recent year-classes indicate possible recovery of the Div. 4X stock.

4. Flatfish

Total landings (Maritimes and Quebec) increased by 10% over the 1973 figure to 27,500 metric tons. American plaice was again the principal species landed and accounted for the increase.

Newfoundland landings, mainly American plaice and witch flounder from the northeast Gulf of St. Lawrence (Div. 4R) and Banquereau (Subdiv. 4Vs), increased by 55% over the 1973 level to about 5,800 metric tons.

The increase in flatfish landings reflects greater effort on these species in response to restrictions on haddock fisheries and reduced cod and redfish landings in the Scotian Shelf and Gulf of St. Lawrence, respectively.

Atlantic halibut landings were down 8% at 861 metric tons.

5. Redfish

Total landings (Maritimes and Quebec) decreased by 43% from the 1973 level to about 61,000 metric tons and Newfoundland landings fell by 53% to 17,000 metric tons. The reduction was almost wholly due to reduced landings from the Gulf of St. Lawrence (Divs. 4R-S-T), the result of a combination of reduced stocks and marketing difficulties.

6. Pollock

Landings were down 15% from those of 1973 at about 21,000 metric tons, reversing the trend of increased landings in recent years. Restriction of fishing effort related to haddock fishing regulations and possibly reduction of the stock due to fishing pressure probably contributed to the decrease. The bulk (87%) of the landings were from the southwest Nova Scotia-Bay of Fundy area (Div. 4X).

7. Other groundfish

Landings remained at the same level as in 1973.

8. Scallops

Sea scallop (*Placopecten magellanicus*) landings from the Scotian Shelf (Divs. 4X-W-V) fell by 38% from the 1973 level to 2,967 metric tons (whole weight). Newfoundland landings of Iceland scallops (*Chlamys islandicus*) from the northern Gulf of St. Lawrence (Div. 4R) fell to 196 tons, about 10% of the 1973 landings; sea ice restricted operations. Landings of sea scallop declined to 15% of the 1973 landings.

9. Herring

Landings from Subarea 4 (excluding Div. 4 R-S) amounted to about 191,000 metric tons, up 16% from 1973. Landings from southwest Nova Scotia (Div. 4X) increased by 22% to 124,700 metric tons and from Div. 4W by 300% to 23,500 metric tons. Those from the southern Gulf of St. Lawrence (Div. 4T) decreased by 28% to 23,000 metric tons, and from the northeast Scotian Shelf (Div. 4V) by 39% to just over 9,000 metric tons. The southwest Nova Scotia fishery confirmed the importance of the 1970 year-class and comparative weakness of the 1971 and 1972 year-classes.

Newfoundland landings from the eastern Gulf of St. Lawrence (Div. 4R) decreased from 26,650 tons in 1973 to only 7,260 tons in 1974, mainly due to reduction in effort caused by severe icing conditions in St. George's Bay in the spring of 1974.

10. Mackerel

There was a decrease in mackerel landings in subarea 4 (excluding Div. 4R) of 24% from the 1973 level to 14,061 metric tons of which 48% was taken in the southern Gulf of St. Lawrence (Div. 4T).

11. Tuna

Nominal landings of tuna in 1974 were 6,300 metric tons, about 25% below the 1973 figure. St. Margaret's Bay (Div. 4X) landings amounted to 256 metric tons. The sports fishery took 365 metric tons, 70% above the 1973 level. The average weight per fish of the commercial catch was 297.2 kg, that of the sport fishery 338.3 kg.

12. Atlantic salmon

The total 1974 catch, including commercial and sport fishing, but excluding landings from the Newfoundland fishery in Div. 4R, was 457 metric tons, up 41% from 1973. The commercial catch (231 metric tons) increased by 62%, the angling catch (226 metric tons) increased by 28%. The ban on commercial fishing in New Brunswick and the Gaspe Peninsula (Divs. 4X-T) continued. The Newfoundland catch in Div. 4R was 146 tons, compared with 153 tons in 1973.

B. SPECIAL RESEARCH STUDIES

1. Environmental Studies

a) Hydrography. Tidal heights were measured near the edge of the continental shelf using deep-sea gauges from oil drilling rigs. Studies of coastal circulation continued. Physical oceanographic surveys including T-S and current measurements were carried out in the Gulf of St. Lawrence and T-S measurements taken along the Halifax section.

Studies of temperature profiles in relation to catches of commercial fishes and shrimp (*Pandalus borealis*) were carried out in the central and western Gulf of St. Lawrence (Div. 4S-T).

Physical oceanographic and suspended sediment studies were continued in various estuaries, inlets, St. George's Bay (Div. 4T) and Bras d'Or Lakes. Chemical and oceanographic studies of major and trace elements, nutrients, suspended particulate matter and concentration of petroleum residues continued, with particular reference to mixing areas of river and ocean water and water-sediment interface. Small scale physical processes through the Gulf Stream and circulation and mixing between the Gulf Stream and continental slope were studied.

b) Plankton studies

Hydrography, nutrients, phytoplankton and zooplankton biomass and C^{14} uptake by phytoplankton in the Yarmouth upwelling were studied, also the effects of feeding of euphausids in chlorophyll concentration. Inshore studies of the distribution, growth, and succession of fish larvae in relation to prey size, abundance and distribution were continued.

c) Other environmental studies

Completion of studies of the occurrence of petroleum and naturally-occurring hydrocarbons in sea water between Halifax and Bermuda shows that petroleum hydrocarbon concentrations were low, about 1 µg/ℓ or less and appear limited to the upper 10 m, with no evidence of effect on phytoplankton growth.

2. Biological Studies

a) General

Annual groundfish research survey cruises were completed in the Scotian Shelf and southern Gulf of St. Lawrence (Divs. 4X-W-V-T) in July-August and in the southern Gulf of St. Lawrence (Div. 4T) in September. Herring larval surveys were carried out in the Bay of Fundy and Gulf of Maine (Divs. 4X, 5Y) in February, March, and October-November, and in Banquereau-Western Bank and coastal Nova Scotian waters (Divs. 4W-Vs) in October. A monthly sampling cruise for juvenile herring was implemented in Passamaquoddy Bay and its approaches in the Bay of Fundy (Div. 4X).

Monitoring and biological sampling of commercial landings continued. Sampling procedures were reviewed. A new statistical model, based on cluster sampling, was developed for estimation of catch at age.

A comparative fishing experiment was undertaken to intercalibrate results of surveys by the research vessels A.T. CAMERON and E.E. PRINCE.

Experiments were carried out to develop the technique of survey design in relation to the use of echo-counting in surveys for estimation of groundfish population abundance and distribution.

The impact of marine mammals as predators or competitors of commercial fish is being estimated by considering energy profiles of the mammals.

Research trawl surveys were carried out to compare catch rates of various groundfishes in relation to depth and temperature in the Laurentian Channel, the edge of the channel, and on the Magdalen Shallows.

b) Cod

Results of several years' egg and larval survey cruises in the Gulf of St. Lawrence (Div. 4T-Vn migrating stock) are being examined in relation to environmental factors, parent stock biomass and recruitment to the fishery.

Returns from June 1973 tagging experiments in the Bay of Fundy have been largely from the tagging area and from inshore waters of Nova Scotia. This agrees with the hypothesis that cod on the offshore banks of Browns and LaHave (Div. 4X) form a population distinct from those inshore. Over-exploitation of the Browns-LaHave stock has reduced the population to well below that giving maximum sustainable yield.

In Div. 4R trap catches consisted mainly of 5-and 6-year-old fish, gillnet catches 8- and 9-year-old, and offshore catches of 9 years of age and younger fish.

c) Haddock

Recruitment to the Sable Island Bank (Div. 4V-W) stock was poor but the southwest Nova Scotia (Div. 4X) stock has benefited from recruitment of moderately good 1969, 1971 and 1972 year-classes. Strong 1962 and 1963 year-classes sustained the Div. 4X fishery in the late 1960's but subsequent poor year-classes resulted in a dangerously low level of the spawning stock. Catch levels of about 15,000 tons per year would appear to offer a modest increase in spawning stock abundances without fishing mortality exceeding the level maximising yield per recruit.

A study of the occurrence of the protozoan parasite *Eimeria gadi* in the swim bladder of gadoids in the southwest Scotian Shelf (Divs. 4X-W) and Georges Bank (Div. 5Z) showed that only haddock were infected, with highest incidence in the Emerald Bank area, then decreasing to the southwest, with an average incidence of 32.3%. Infection was negligible in fish less than 35 cm in length, but thereafter there was no relationship between degree and infection and size or sex of the host.

d) Redfish

The Gulf of St. Lawrence fishery (Divs. 4R-S-T) continued to be heavily dependent on the 1956 and 1958 year-classes. Research surveys indicated substantially diminished prospects for the next several years, the only substantial recent class, that of 1966, being only about one tenth of the combined 1956 and 1958 year-classes. Catch per unit effort of midwater trawlers in 1974 was 70% less than at the commencement of the midwater trawl fishery in 1972. Survey cruise catch rates of 1974 averaged 20-30% less than those of 1973.

e) Herring

Larval surveys in the Banquereau-Canso area (Div. 4V-W) in October-November failed to indicate larval concentrations as an indication of spawning in the area. Adult herring in the area are fall spawners, and are present from November through February. The northern (Subdiv. 4Vn) component of this fishery showed a decline in modal age from 5-10 year old fish in 1970-73 to 4-year-old fish in 1974, with reduced catches. The southerly (Div. 4W) component of the fishery showed increased catch per unit effort, probably associated with a strong 1970 year-class.

Larval surveys in the Bay of Fundy (Div. 4X) and its approaches gave added evidence for existence of separate spawning stocks in the Grand Manan and Trinity-Lurchers areas.

Sampling of herring for commercial landings for length, weight, sex, maturity, and age continued.

A total of 35,391 herring were tagged in the Grand Manan-Campobello area of the Bay of Fundy and off southwest Nova Scotia (Div. 4X). Results of 1973 and 1974 tagging in the Grand Manan area indicate a major movement along the New Brunswick shore into the Bay of Fundy, a substantial movement across the Bay to the Nova Scotia shore and a lesser movement westward along the Maine coast. Returns of the external dart tags have continued for at least 9 months after tagging with 2.3% returns from the 1973 experiment.

f) Mackerel

Length frequency data indicate that juvenile mackerel move north into Canadian waters later than adults and do not reach the spawning grounds in the Gulf of St. Lawrence (Div. 4T) but remain off the Nova Scotia coast (Divs. 4X-W, Subdiv. 4Vs). Recoveries from 1973 tagging in St. Margaret's Bay (Div. 4W) indicate migration south as far as Long Island, New York, where they are exploited in the international winter fishery. In 1974, 10,703 mackerel were tagged in areas including the Bay of Fundy (Div. 4X), St. Margaret's Bay (Div. 4W), Cape Breton (Div. 4V), and the Gulf of St. Lawrence (Div. 4T).

g) Tuna

Forty-eight large bluefin were tagged. Six tags were recovered from the joint Canadian-U.S. tagging program of 1971-73, five from near the release area, the other 535 miles from the release site after 3 years at large.

3. Gear and Selectivity Studies

Field data are being used in a new computer program to produce base information on shapes and sizes of more than 30 types of rigging of commercial trawls under different towing conditions.

A deepwater airlift hydraulic bottom-sampling dredge was designed, built and tested. Development of a bottom-referencing underwater towed instrument vehicle (BRUTIV) continued with performance to design specifications: maintains an altitude within one foot over a wide range of towing and seabed conditions down to 400-ft depth.

Trials were carried out on selectivity and masking effects for Digby scallop dredges in the Iceland scallop fishery.

Subarea 5

A. STATUS OF THE FISHERIES

1. Groundfish general

Total landings (6,693 metric tons) fell by 11% from the 1973 level.

2. Cod

Landings (1,496 metric tons) were only 45% of those of 1973, reversing the trend of the previous two years.

3. Haddock

Only 664 tons were landed, reflecting restrictions on haddock catches in the Subarea.

4. Pollock

Landings more than doubled from the 1973 level, to 3,562 metric tons, mainly from the Georges Bank area (Subdiv. 5Ze).

5. Sea scallop (*Placopecten magellanicus*)

Exceptionally high catches from the north peak of Georges Bank (Div. 5Z) contributed to 42% increase in landings over the 1973 level, to 49,725 metric tons.

Landings of scallop meats averaging more than 50 units per pound was prohibited as from May, 1974, the second step towards implementation of the ICNAF regulation aimed at prohibiting landings of meats averaging more than 40 units per pound.

6. Herring

Herring landings fell to 45% of the 1973 level at little more than 4,000 metric tons.

7. Tuna

The mid-Atlantic coast purse-seine fishery took 103 metric tons, only 16% of the 1973 landings. The average weight of 1,848 fish was 10.8 kg, with length ranging from 45 to 195 cm.

B. SPECIAL RESEARCH STUDIES

1. Biological Studies

a) Sea scallop. Efforts were mainly concentrated on sampling catches for individual meat sizes and developing methods for analyzing meat-size data. A model of the Georges Bank fishery was developed which takes into account spatial variations in recruitment and fishing effort.

SECTION III. HARP AND HOOD SEALS

(Subareas 1, 2, 3 and 4)

A. STATUS OF THE FISHERIES

Canadian catches of harp seals totalled 92,050 (77,568 young, 14,482 older seals). The ship quota of 60,000 tons was not taken but the allowance of 30,000 to landsmen was exceeded. About 15,000 harp seals were caught in the Gulf of St. Lawrence (Div. 4R-S-T), the remainder on the Front (Subareas 2 and 3). Only 203 hooded seals were caught (115 young, 88 adults), all on the Front.

B. SPECIAL RESEARCH STUDIES

Harp seals (*Pagophilus groenlandicus*)

Aerial surveys for estimation of members of harp seals were carried out in the Gulf of St. Lawrence. A new technique using ultra-violet radiation detection in place of visible light showed great promise and will be incorporated in future surveys. Aerial photographic surveys on the 'Front', northeast of Newfoundland could not be completed. Age compositions of catches of young harp seals in relation to catch levels indicate that a quota of 150,000 harp seals as of the right order of magnitude to maintain present herd size.

Hooded seals (*Cystophora cristata*)

On 25 March 1974 the suspected existence of a population of hooded seals in the Davis Strait was confirmed by aerial survey and ice observers.

Counts by aerial survey, estimates of age composition and migration studies are planned for 1975.