

ANNUAL MEETING - JUNE 1967Summary of Status of the Fisheries and Research
Carried Out in Sub Area 4 in 1966

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This report is compiled on the basis of research documents numbered as follows: 10, 11, 13, 14, 17, 18, 19, 20, 21, 22, 24, 30, 66, 76, 78, 79, 80, 84, 85, 86, 95 and 106, prepared by: Canada, Federal Republic of Germany, Poland, Portugal, Spain, USSR, UK and USA.

1. STATUS OF THE FISHERIES

Total production continued to rise with a yield of 805 thousand metric tons in 1966, an increase of more than 3% over the previous year. Nine countries recorded fishing in the sub area: Canada, France, Norway, Poland, Portugal, Spain, USSR, UK, and USA. Nominal catches by Norway, Poland and UK were less than 500 tons. Nominal catches of groundfish fell off to 504 thousand tons (including 57 thousand tons of flatfish) from 536 in 1965, 517 in 1964, and 537 in 1963. Catches of pelagic fishes at 236 thousand tons were substantially more than those for 1965.

Cod catches in sub area 4 fell in 1966 by about 4% to 217 thousand metric tons. Cod provided much the most productive groundfish fishery but was second to herring in total production for the sub area. Canadian production from Divs. 4T, 4X, 4V_N and 4W dominated the fishery. Spain from Divs. 4W and 4V_S, France from Div. 4R, Portugal from Div. 4R and USSR from Divs. 4W and 4X also pursued active fisheries. The 10% decline in Canadian catches was accompanied by increased production of haddock and redfish. In the Gulf of St. Lawrence (Div. 4T) Canadian discards of cod were negligible.

Haddock landings fell off by about a quarter to 66 thousand tons. This is associated with reduced production by USSR in Div. 4W which was only partly compensated for by exploitation in Div. 4X. Canadian haddock landings from Div. 4X improved significantly and US production from the division declined.

Redfish landings by Canada and USSR continued to rise to produce 106 thousand tons mostly from Divs. 4R, 4S, 4W, and 4X all of which showed improved production. Improved recruitment to the stock has led to the transfer of effort to redfish fishing.

Silver hake production from sub area 4 again dropped sharply to about 10 thousand tons. USSR scientists consider the decrease a result of a series of poor year-classes (1961-1964), possibly associated with cooling water temperatures on the Nova Scotian shelf.

Flounder landings from the sub area continued to increase reaching 55 thousand tons. The Canadian fishery showed no important changes. Discards remained high for American plaice and negligible for witch. Winter flounder seem to be increasing in importance in Div. 4T. Yellowtail in Divs. 4V_S and 4W were subjected to less fishing pressure. USSR landings of flounders increased significantly.

Total pollock catches remained fairly constant at 25 thousand tons but Canadian landings fell off by more than 40%. Much of the deficiency was made up by USSR and Spain. Most fishing was in Divs. 4W and 4X.

Approximately 15 thousand tons of argentine were taken by USSR vessels fishing along the slopes of the shelf from Banquereau to Browns Banks (Divs. 4W to 4X). This is almost three times the production of the previous year and almost twice the record catch of 1963.

Herring landings of 234 thousand tons were about a third higher than those of the previous year. The increase was mainly due to increased Canadian production in Div. 4X.

There were no noteworthy developments in mackerel or swordfish fisheries.

Converted catches of scallop show a little more than 5 thousand metric tons for the sub area during 1966. This is only a little over half of the catch of the previous year. Browns Bank (Div. 4X), Middle Bank (Div. 4W), Bay of Fundy (Div. 4X) and the southern Gulf of St. Lawrence all contributed to the catch. Economic factors are considered responsible for the decline.

2. WORK CARRIED OUT

a. Canada: A T Cameron and other research vessels. Oceanographic conditions at coastwise stations, the Halifax section, and Cabot Strait. Surface and bottom circulation in Divs. 4T, 4W, and 4X. Activity coefficients of ions in sea water. Micro distribution of surface plankton. Benthos and sediments in Divs. 4R, 4S, and 4T and bioenergetics in a small bay in Div. 4X. Cod populations and egg and larval studies in Div. 4T. Population studies of Div. 4T cod. Haddock year class strengths, food, maturity, and fecundity. Size, age, and recruitment of Div. 4W haddock.

Biology and population studies of Div. 4R and 4S cod. Surveys and biological observations on redfish, herring, yellowtail, argentine, and sea scallop. Herring sampling, ages, fatness, and tagging methods. Mackerel growth rate, spawning, and migrations. Tuna sampling and tagging. Salmon smolt tagging. Harp seal mortalities and statistics.

b. Federal Republic of Germany: Research vessel Walther Herwig. Environmental and biological studies in Divs. 4V and 4W. Cod tagging.

c. Poland: Research vessel Wieczno. Temperature and salinity observations. Distribution, abundance, and sizes of commercial fishes.

d. Portugal: Lengths, ages and maturities of Div. 4R cod.

e. Spain: Discards, tag recovery, relative efficiencies of fishing practices.

f. USSR: Eight cruises in Divs. 4X and 4W with 6 sections. The standard Halifax section 6 times. Lengths of silver hake in Div. 4W. Age composition of haddock from Sable Island area (Div. 4W).

g. UK: Continuous plankton recorder surveys.

h. USA: Validity studies on otoliths of Div. 4X haddock and cooperative study (with Canada) of haddock stocks there. Lengths, age and meristics of herring. Identity of hake species.

3. HYDROGRAPHY

Canadian observations showed surface temperatures generally to be higher in 1966 than in 1965, and bottom temperatures at the entrance to the Bay of Fundy (Div. 4X) showed autumn cooling to be less in 1966 than in the preceding year. However, analyses indicated that the general cooling regime continued at least until 1965. Cabot Strait showed relatively low temperatures (4.3C) in a reduced volume of the warm deep layer.

USSR observations in Divs. 4X and 4W showed the cooling process to continue into 1966.

Poland confirmed increasing surface salinities along the coast of Nova Scotia from northeast to southwest and increasing bottom salinities on the slopes of the shelf with increasing distance from the coast.

4. PLANKTON

Egg and larvae studies by Canada (Div. 4T) shows that in 1966 cod spawned earlier than in 1965 and that the eggs were spread more evenly through the Gulf of St. Lawrence.

5. COD

The annual survey in the southern Gulf of St. Lawrence (Div. 4T) with small-meshed otter trawl in September showed catch per tow down by about 4% although small two-year-old cod were numerous.

Consideration by Canada of cod stocks in Div. 4T at the request of Panel 4 has shown a marked decrease in the size of fish landed, decreases in size at age, and greatly increased recruitment in recent years. These changes have been associated with mesh regulations and with greatly increased fishing effort. Analysis of the data suggest density dependent growth rates. Although changes in environmental conditions as described under "hydrography" may be involved, changes in recruitment and thus in productivity may be related to stock size in a modification of a steady state model.

Canadian studies of cod in the northern Gulf of St. Lawrence confirmed the validity of the otolith method of age determination for application there. In Divs. 4R, 4S and 3P_N growth rates in cod increased between 1961 and 1966 coincident with the reduction in abundance of larger older fish and peak trawler landings and the resulting increased mortality rates. There is evidence of incomplete mixing. Size and age data on trap caught cod from the north shore of the Strait of Belle Isle show the fishing to depend on newly recruited year classes and an increased total mortality. The biology of the stock is dealt with in some detail.

German tagging confirmed earlier conclusions that cod move from Div. 4V_N in January to Div. 4T in summer and presumably back again in autumn.

6. HADDOCK

Canadian survey cruises on the Scotian Shelf (Div. 4W) showed low catches of both commercial-sized haddock and smaller ones suggesting weak 1964 and 1965 year classes. Predictions of good 1962 and 1963 year classes were not realized in the Canadian fishery presumably because of heavy fishing in 1965 in the division which took about 45 thousand tons. A Canadian report on the size, age, and recruitment of haddock of the central Scotian shelf for the period 1948 to 1965 demonstrated that relative success of the fishery relied strongly upon year class strength. Size and age composition was quite stable, and incidental mortalities from other fisheries were not significant in affecting recruitment. However, the heavy 1963-1964 silver hake fishery and the direct mortality imposed by the USSR haddock fishery of 1965 appear to have cut down the abundance of potential recruits to the Canadian fishery.

USSR age analyses based on 1965 and 1966 otolith collections showed the 1963 year class to be best represented in 1966 and the 1960 year class in 1965.

7. SILVER HAKE

USSR found that as in the two previous years in Div. 4W four year old silver hake were best represented (41%) in their catches with three year olds and four year olds about equal.

8. HAKE Sp.

Canada studied hake biology and fishery in Div. 4T. Males were 50% mature at 49 cm and females at 52 cm.

USA made a study of the hakes in Sub areas 4 and 5 concluding that all hake north-east of 4Vs should be designated as white hake (Urophycis tenuis) for statistical purposes. Line caught and large hake elsewhere can also be designated as that species.

9. REDFISH

A Canadian survey involving five lines across the Nova Scotian shelf found water temperatures lower than in 1962 and redfish not abundant. However, on the east side of Sambro Bank good catches were obtained. Along the central part of the shelf there were indications of commercial quantities of redfish at the seaward end of the lines at depths between 350 and 500 m.

10. FLOUNDERS

Canada is continuing biological studies of yellowtail flounder and American plaice. Clinal difference in yellowtail stocks are indicated on the Nova Scotian Banks but the population of small fish on the Magdalen shallows (Div. 4T) is distinct from those on the Nova Scotian Banks (Divs. 4W and 4Vs). Yellowtail appear to remain at the same area and depth throughout the year and must accordingly be subjected to a wide variety of temperatures.

Growth and longevity studies of American plaice from four areas were completed. Passamaquoddy Bay (Div. 4X) was found to have the fastest growth rate, shortest life span, and smallest ultimate size.

11. HERRING

Extensive Canadian sampling of herring in southern New Brunswick (Div. 4X) showed the 1964 year class to predominate during the early part of the year with 1963 second in importance. From April until August the 1963 year class was most abundant. Around southwest Nova Scotia (also Div. 4X) the 1963 year class dominated with 1961 second in importance.

USA studies of fish from about the same area showed strong year classes for 1960, 1961, and 1962. Meristic studies did not reveal statistical differences between herring populations of Maine and Nova Scotia but did show differences between them and herring from Georges Bank and Cape Cod.

12. ARGENTINE

Where good catches were made in Canadian prospecting for argentine in Divs. 4Vs and 4W echo sounder traces which showed fish on the bottom where they were caught extended off the shelf in the same water layer. Catches were made at depths between 180m and 320m. Biological studies are being continued.

Poland made good argentine catches near Browns Bank (Div. 4X) over similar depths but as shallow as 115m. Good catches were observed at depths between 250 and 300 m. Argentine were segregated by size with the larger fish coming from deeper water.

13. MACKEREL

Canadian studies on mackerel in Divs. 4X, 4W, and 4V found growth rapid during the first three years of life but slow growth thereafter. Tag recoveries confirmed migration northeast along the Nova Scotia shore.

14. SALMON

To increase data on the effects of the Greenland salmon fishery Canadian salmon smolt tagging has been increased in the Miramichi River, N.B. and the Margaree River, N.S. Nearly 65,000 smolts were tagged in 1966. From 42,000 smolts tagged in 1965, 430 were recaptured as grilse in Canada and 111 in the Greenland fishery.

15. SEA SCALLOP

Canadian scallop surveys in the Bay of Fundy showed relatively offshore beds to support good populations of scallop which are currently not being fully exploited by fishermen.

16. SEALS

Some 25 tags put on harp seal pups in Div. 4T in March were recovered from West Greenland (subarea 1) between March and June. Two tags were returned from Labrador (subarea 2).

Canadian sealing statistics for several areas were tabulated for 1949-1966. The take in 1966 for all is recorded as 175,041 harp seals and 5,703 hood seals.

NOMINAL CATCHES BY SPECIES GROUPS AND COUNTRIES

In SUBAREA 4

1965 vs. 1966

Thousands of Metric Tons

	Canada	France	Portugal	Spain	USSR	USA
Cod	1965	142	15	15	43	10
	1966	130	16	11	47	11
Haddock	1965	32	--	--	3	45
	1966	40	--	--	3	21
Redfish	1965	36	--	--	--	2
	1966	63	--	--	--	14
Silver Hake	1965	--	--	--	--	50
	1966	--	--	--	--	10
Other Groundfish	1965	42	--	--	1	13
	1966	28	--	--	2	9
Halibut	1965	2	--	--	--	--
	1966	2	--	--	--	--
Other Flatfish	1965	39	--	--	--	8
	1966	41	--	--	--	14
Herring	1965	174	--	--	--	6
	1966	234	--	--	--	2
Other Pelagics	1965	12	--	--	--	1
	1966	12	--	--	--	1