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DRAFT

Summary of Research Work carried out in Subarea 3 in 1961

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Researches in Subarea 3 were intensified during the year, more countries engaging in research and some of the others increasing their research efforts.

COD

Canada's inshore fishery was less successful than usual with cod less available to shallow water traps (Doc. No. 16). Fish caught near shore in traps are mainly 4 to 6 years old and for successful trap fishery a constant succession of good year-classes is necessary. The 1955 year-classes has been relatively numerous. The deep-water longline fishery off Bonavista which is also subject to a European otter trawl and longline fisheries continued its steady decline from 100 pounds in 1957 to 35 pounds in 1961. The annual autumn survey of the inshore shallow water areas for young cod of the 0+, 1+ groups was continued. All these age-groups were caught in smaller numbers in 1961 than in 1960 and it is possible that both 1960 and 1961 are poor.year-classes. On the other hand the value of this beach-seining method of assessing the success of new-year-classes has not yet been established for the subareas.

In an A.T.Cameroncruise, March 20-29 (Canada, Doc. No.16), in which otter-trawl sets were taken on a northern and a southern line of stations on Flemish Cap, the best cod catch (0.9 metric tons of cod and 0.8 metric tons of redfish in a half hour set) was south of Flemish Cap at 216 (200-237) fathoms at a bottom temperature of 3.8°C. Most of the mature spawing cod were south of Flemish Cap rather than to the north. On Flemish Cap almost all the cod were spent having spawned in March and some probably in February.

The cod concentration on Flemish Cap in the shallow water, 95-130 fathoms, were feeding mainly on small cod and those in the deeper water, 150-240 fathoms, almost entirely on small redfish. A large cod concentration was found on the northern slope of the Grand Bank at 100-120 fathoms (1.2 to 2.0°C bottom temperature) feeding on young capelin. These cod were expected to spawn mainly in May and June.

Germany carried out a search cruise for cod in March-April to 3M, 3O, 3Ps and 3Pn (Doc NO. 24).

Portugal (Doc. No.25) carried out extensive measuring and sampling of cod in 3K, 3L, and 3Ps and 3Pn. With the exception of the 1959 year-classes in 3L and 3Ps year-classes were not strongly dominant. A growth curve for males and females for the whole of Subarea 3 is presented showing no clear distinction between the growth rate of males and females. In view of the large numers of cod aged this is very likely due to conbining several stocks with different growth rates.

Few spawing females (0.6-3.4%) were observed between April and June. Studies were carried out on sex ratio, stage of maturity and age at first maturity.

France (Doc. No. 28) collected data for size of cod and cod otoliths for age determinations, on board a deep-sea trawler south of Newfoundland in February-April.

Spain (Doc. No. 37. 38, 39) reported on size, age and growth of cod and on the commercial fishery. Growth rate for 3Ps was considerably greater than that for 3K. Apart from 3K where there were significant numbers of older fish, almostall the fish were below 9 years of age. The fish were largest in 3Ps in April and in 3L in August. Sex ratio and age at first maturity were also studied. The sex ratio results are very unusual, 14-33% males (and 11-33% including also Subareas 2 and 4), in view of the pPortuguese results on a larger amount of data (Doc. No. 25) showing a slight predominance of males (54-56%) almost all (90%) of the Spanish fishing in the subarea was on the Belle Isle ground, 3K and on Hamilton Inlet Bank, 2J. The best

fishing in those areas occured in May.

The United Kingdom (Doc. No. 44) measured cod on board factory factory trawlers.

In the U.S.S.R. investigations (Doc. No. 48) concentrations of cod occured in Division 3K in April. Most of the mature cod had already spawned. In 3K, the 1952, 1953 and 1955 year-classes were most abundant but there was little dominance of individual year-classes. The dominant year-classes in 3L were those of 1952, 1955, and 1957 in 3O, 1954 and 1955 and in 3P, 1955 and 1956. Older cod were more abundant in the northern area than in the southern divisions. Cod of Flemish Cap (3M) spawn in February-March, on the northeastern slope of the Grand Bank (3L) in May-June and most of the cod of the southern part of the Grand Bank (3N, 3O) in June. Cod tagged in 3P and 3O showed no long migrations, Racial investigations indicate 4 cod populations with different characteristics-1, from ~~KKoUKhArK~~ southern Labarador to northern Grand Bank; 2. Flemish Cap, 3. NE and Se Grand Bank; 4. SW Grand Bank. Redfish racial investigations indicate 3 Sebastes mentella stocks occupying respectively 2J, 3K and 3L; Flemish Cap (3M; 3P (and presumably 3O), Nova Scotia and New England Areas. 3N is an intermediate area whose redfish have a relationship to the southern stock.

Cod spawing areas are probably located on the NE slope of the Grand Bank, on the SW Flemish Cap, in the shallow waters of 3N and on the SW Grand Bank slope (3O).

Redfish

In Document No. 12 the trend in the United States redfish fishery on the Grand Bank is reviewed. The catch per day decreased rapidly in the first 5 years of the fishing, 1951-1955 and has since stabilized at about half the catch per day from the virgin fishery .

Polish scientists on the factory trawler Fastor investigated redfish on the NE slope of the Grand Bank (Division 3L) in August-September. Trawling was in 230-400M (generally in 270-300m) and mentella made up 98.7% of the catch. The percentage of females and the average length of the redfish increased with increasing depth. Data were collected on redifsh length, frequencies, sexes and weights (Doc. No. 15).

Catches by the A.T.Cameron (Canada, Doc No. 16) on the eastern slope of the Grand Bank in September were almost entirely mentella. The best catches were between 150 and175 fathoms to the south and 175 and 200 fathoms toward the north. On Flemish Cap in late March, mentella were almost plentiful (3 tons per hour's drag ing) at 350 fathoms. There was an unusual abundance of large mentella males at350 fathoms. Hariuns were scarce and both marinus and mentella were 50 fathoms or more deeper than in Summer. The mentella females with best developed larvae (many ready for extrusion) were found in the deep water, 250-290 fathoms. In shallow water, 200-150 fathoms, larval development was at least several weeks behind that at 250-290 fathoms.

On the northern slope of the Grand Bank the best redfish catches (mentella) were 4.6 tons per day hour at 240 fathoms with catches half this size at 200 and 175 fathoms. Both here and at Flemish Cap mentella sizes increased with depth. On the northern slope of the Grand Bank spawing also the mentella females with the most highly developed larvae lay deep, at 275 fathoms, whereas at 240, 200 and 175 fathoms the degree of larval development was progressively less. On the northern slope of the Grand Bank spawing had progressed further than at Flemish Cap with 12% of the females at 275 fathoms already spent on March 29 and an additional 45% withlarvae ready for extrusion.

At Flemish Cap small redfish from 1+ ages and upward were plentiful and were especially numerous in cod stomachs while on the northern slope of the Grand Bank young redfish below 24 cm were alomst entirely absent.

A study of redfish food in Hermitage Bay on the South coast of Newfoundland showed the food to be mainly euphausiids with the larger redfish having a preference for larger food organisms and for small fish when these are plentiful (Canada, Doc. No. 16).

The U.S.S.R. (Doc No.48) found redfish most concentrated during the months close to and including the spawing time of the females, March-June, and no dense concentrations were observed from July to December. Maximum spawing apparently occurs in April-May.

The predominant ages of redfish in 3K and 3L were for males and 20-22 years for females and in 3M, where redfish were smaller than usual, 11-12 years for males and 12-13 years for females.

East Germany (Doc. No. 60 carried out 2 exploratory cruises finding in September-October concentrations of small redfish on the S. slope of the Grand Bank and of somewhat larger redfish on the southern part of the eastern edge of this bank. In the latter area redfish were larger with increasing depth.

Iceland (Doc. No. 61) had summarized the changes in landings and informations on redfish length from the redfish fishery mainly in the northern part of 3K since the beginning of this fishery following explorations by Icelandic trawlers in 3K in 1958. Redfish catches by Icelandic trawlers in 3K declined from 48,400 and 6,500 metric tons in 1960 and 4,200 metric tons in 1961.

Poulsen (Doc No. 2) summarized the Sampling Yearbook data on length and sex distributions of redfish from 1955 to 1959 with some data from 1960. This is a frustrating study because it is evident that there are great differences between countries in the separation of marinus and mentella, particularly in subarea 2 and in 3K. It is possible that in the 1958 Icelandic exploratory fishing data, which constitute such a large portion of the samples from 2J and 3K and which appear to be excessively marinus, most redfish were recorded as sebastes marinus as an inclusive term without separation into marinus and mentella but were included in the Sampling yearbook and consequently in this manuscript as marinus.

Also, for most of subareas 1 and 2 and divisions 3K, 3L and 3M the redfish samples represented in the Sampling Yearbook are typically from catches of exploratory vessels and hence are not necessarily representative of the commercial catch,. All of this prevents adequate comparsions of sizes of marinus and mentella in subarea 2 and in 3K and 3M, and in the reviewer's opinion leads to the incorrect conclusion that marinus is more plentiful than mentella in 2J and 3K. Almost all the redfish reported in the Sampling Yearbook from these areas in 1959 were mentella.

Also the location(depth) for marinus and mentella recorded in the Sampling Yearbook appear to be too inclusive to be useful and if used lead to the erroneous conclusion that Marinus concentrations do not lie shallower than those of mentella

"Other Side"

Cont'd from opposite side.

The offshore fishery in Subarea 1 is for marinus; in 2J, 3K and 3L in certain locations and depths there may be significant amounts of marinus although the modern fishery is apparently almost entirely dependent on montella. In 3N, 3O, 3P and southward marinus, where present is insignificant in the commercial fishery.

The study is, however, a very useful one at this stage, documenting the great decrease in size of redfish of the ICNAF area from north to south, pointing up the difficulties in dealing with marinus and mentella and showing how far we have to go before the redfish material reported in the Sampling Yearbook for Subarea 2 and the northern half of Subarea 3 can be added together to present an international picture of the redfish population and of the commercial redfish catch in these Subareas.

Haddock

Haddock concentrations in summer on the Southeast Shoal of the Grand Bank were probably not as great as in 1960. From a research cruise of the A.T.Cameron on the southern Grand Bank the most abundant haddock were of the 1955 year-class, 65% by number of the catch, with a modal length of 36-37 cm. The 1956 year-class was about one-quarter as abundant as that of 1955. Since 1956 there has been no successful year-class, that of 1956 showing the only significant survival and this is not expected to be large enough to provide a very significant addition to the commercial fishery. The trend in the haddock fishery over the next 4 or 5 years is expected to be strongly downward (Canada, Doc. No. 16).

The USSR (Doc1 No.48) researches showed a single size group of haddock on the Grand Bank (3N and 3O) with peak sizes of 36-43 cm. In 3P in February the length frequency was trimodal with peaks at 32-37, 42-47 and 52-53 cm. There has been very little haddock fishing in 3P in recent years and the larger fish have not been fished out as on the Grand Bank. A smaller group, presumably the 1958 year-class, is showing up relatively more strongly than on the Grand Bank but this is probably because the older year-classes present were not as successful as those on the Grad Bank. A considerable dominance of the 1957 and particularly the 1956 year-classes was found in these haddock which were mainly from 3N and 3O. In the Canadian investigations (see above) the 1955 and, in considerably lesser measure, the 1956 year-classes were dominant. There is evidently one year difference in age-reading here.

American Plaice

Tagging of American plaice has been carried out on the Grand Bank. With the intensive fishing and the reduction of size of plaice the proportion of fish with jellied fillets is declining. Plaice on the northern Grand Bank grow more slowly than those on the southern parts of the bank. Effort for plaice has been rapdily increasing and the catch per unit of effort is declining except on the northern half of the Grad Bank (Canada, Doc. No. 16). The USSR (Doc. No. 48) reports spawning of American plaice in 3M, 3N and 30 from April-June. Poland (Doc. No. 15) measured American plaice in 3L.

Stock Divisions

Summaries of information on cod and haddock stock divisions and on halibut distribution have been made respectively by Templeman (Doc. No. 47), Grosslein (Doc. No. 17) and Kohler (Doc. No. 43). The cod stocks of the area include the southern part of the Labrador-Newfoundland stock, the Grand Bank, Flemish Cap, northern and southern St. Pierre Bank, Avalon-Burin, and Burgeo Bank stocks. In the winter and early spring the eastward extension of the West Newfoundland cod stock migrates into 3Pn and the northwestern part of 3Ps. The main haddock stocks are those of the St. Pierre Bank and the southern Grand Bank, with the southern Grand Bank usually providing almost all the catch.

The USSR (Doc. No. 48) has carried out work and has come to some conclusions regarding stock divisions in cod and redfish. More details of this work are given in the cod and redfish summaries.

General

The French research vessel Thalassa carried out a research cruise involving a trawling survey and hydrographic work on St. Pierre Bank, the southern slopes of the Grand Bank and Green Bank and on the southern part of the eastern slope of the Grand Bank from mid-July to early September. Several good catches of redfish were made on the Grand Bank slopes. On the western slopes of St. Pierre Bank the moderate catches consisted of redfish, silver hake, cod and haddock (Doc. No.28).

Sand launce spawning grounds are located on the southeastern and southwestern slopes and in the shallow waters of 3N and 3O of the Grand Bank (USSR Doc. No.48).

Poland (Doc. No. 15) reported on measurements of Greenland halibut from 3L.

Plankton

Three reports (Bainbridge and Jones, Glover, and Henderson) have been presented from the Oceanographic Laboratory, Edinburgh, on plankton (including redfish larvae) surveys using the Continuous Plankton Recorder.

The USSR (Doc. No.48) carried out plankton investigations particularly on Euphausiids and Calanus and on the distribution of fish eggs and larvae.

Hydrography

The International Ice Patrol (operated by the US Coast Guard) made hydrographic surveys in Subarea 3 in the period April-July (Doc. No. 12).

Five hydrographic sections across the continental shelf and Labrador Current from off Bonavista to the southern Grand Bank were taken between July 22 and Aug. 21 by the Investigator II. Additionally the St. John-s-Flemish Cap section was taken in March. Bottom temperatures in March were slightly higher on the western slope of Flemish Cap and similar to summer temperatures on the eastern slope. The very low temperature water of -1.7° to -1.8°C in the Avalon Channel in March was replaced by warmer -1.2 to -1.3°C water by July which is unusual. Other oceanographic work in the area was carried out by the Atlantic Oceanographic Group in August-September (Canada, Doc. No.16).

The USSR vessel Topseda carried out 2 hydrographic surveys of the area in May-June and August-September (Doc. No.48).

Research Report, 1962:

Canada	-	1962 Annual Meeting	Doc. No. 16	- ICNAF Serial No.	954
France	-	" "	28	"	966
Germamy E.	-	"	60	"	1003
Germany W.	-	"	24	"	962
Iceland	-	"	61	"	1004
Poland	-	"	15	"	953
Portugal	-	"	25	"	963
Spain	-	"	37	"	977
		"	38	"	978
		"	39	"	979
U.K.	-	"	44	"	985
U.S.	-	"	12	"	950
U.S.S.R.	-	"	48	"	990

Bainbridge, V., and L.T.Jones. Continuous Plankton records: The distribution of plankton off Newfoundland. Annual Meeting, 1962, ICNAF Doc. No. 29, Ser. No. 976.

Glover, R.S. Continuous plankton records: Preliminary notes on sampling between St. John's, Newfounaldn, and Boston, Mass. Annual Meeting, 1962, ICNAF Doc. No. 31, Ser. No. 968.

Grosslein, Marvin D. Haddock stocks in the ICNAF Convention area. Annual Meeting, 1962, ICNAF Doc. No. 17, Ser. No. 955.

Henderson, G.T.D. Continuous plankton records: The distribution of young redfish in 1961. Annual Meeting, 1962, ICNAF Doc. No. 30, Ser. No. 967.

Kohler, A.C. Halibut distribution in the ICNAF Convention Area. Annual Meeting, 1962, ICNAF Doc. No. 43, Ser. No. 984.

Poulsen, Erik M. Length distribution and sex ratio of commercially caught redfish (Sebastes) from the ICNAF area based on Sampling Yearbook, Vol. 1-4. Annual Meeting, 1962, ICNAF Doc. No. 2, Ser. No. 936.

Templeman, Wilfred. Divisions in cod stocks of the Northwest Atlantic. Annual Meeting, 1962, ICNAF Doc. No. 47, Ser. No. 989.