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Excerpts from

REPORT FOR 1949 OF THE
NEWFOUNDLAND BIOLOGICAL STATION, ST. JOHN'S, NFLD.
BY W. TEMPLEMAN, DIRECTOR

REORGANIZATION

Before Union of Newfoundland with Canada in April 1949, the Newfoundland Government Laboratory carried on biological research, some technological and hydrographical research, fisheries analyses, canned and fresh fish laboratory inspection, and general analyses.

After Union the biological and hydrographical section of the Laboratory was placed under the Fisheries Research Board of Canada, renamed the Newfoundland Biological Station, and most of the original staff remained with this Station. The responsibility for technological research and services was transferred to the Atlantic Experimental Station at Halifax, the fisheries analytical and laboratory inspection group work is being set up as a Department of Fisheries Fish Inspection Laboratory and the general analytical laboratory remains under provincial control.

RESEARCH

In Newfoundland the Groundfishes, particularly the cod, haddock, American plaice and rosefish are of the greatest importance. Of these the fishery for cod is at present more valuable than all the other fisheries together and the volume could be greatly increased by devoting more attention to fishing the offshore banks. The haddock, plaice and rosefish fisheries are only in the early process of development and particularly in the latter two a much greater catch is possible even from the stocks discovered during the past three years.

There has always been a shortage of research staff at the Newfoundland laboratory so that problems have to be attacked in rotation. Thus while within the past ten years a good deal of biological research has been completed on the lobster, dogfish, caplin and herring we have during the past three years concentrated our research largely on the Groundfishes. This policy of directing most of the research effort toward the groundfishes will probably be a wise plan in the future also for the Newfoundland Biological Station.

In addition to the Groundfish research Salmon research has been continued because of the wide public interest and of the many problems and the vulnerability of the salmon population. A member of the staff, Mr. Tibbo, has been for several years seconded to the Atlantic Herring Investigation Committee and is stationed at St. Andrews.

Research on the Vitamin A value and yield of liver oil of the various Newfoundland fishes has continued for three years and is now being brought to a close.

Groundfishes

In the Groundfishes there are a number of considerations which motivate our research. First of all in the present poorly developed state of the offshore fishery for these groundfishes and of the poor returns to the individual fisherman from the inshore fishery must come exploratory fishing and the related hydrographic studies to obtain a better knowledge of these fish populations with a view to greater and more economical exploitation. Secondly there is need to lift the veil of ignorance on the general life history of these fishes so that we can think about the fish intelligently and come to wise conclusions. In the second regard no major phase of the life history should be left unstudied. Thirdly a basis should be laid by which major changes in the fish populations can be recognized. While the Newfoundland Station is to some small degree in a position to carry out work on the first two of these objects and by a study of fish lengths and year classes to carry out part of the third task we do not believe that we can gather enough statistical information on the inshore cod fishery for a sound basis of conservation studies and believe that this should be done by some other agency than the laboratory. Also the main centre of fishing on the Grand Bank by the foreign trawlers, where depletion is mostly likely to occur, is not fished by our fishermen. It is possible that an International Commission for the North West Atlantic will help in the providing of the necessary statistics on the Grand Bank.

Research Boat. Since for most of the groundfishes trawling is the only practical way of catching them commercially a groundfish research boat should be a trawler. Our present research boat the Investigator II is doing useful work but to carry out exploratory fishing properly especially in deep water where so large a proportion of these groundfishes is found a considerably larger research boat of the trawler type is required. This boat should be capable of trawling in 300 fathoms. There is also room for a smaller boat for work in hydrography and with long lining trawl and other gear in relation to the inshore fisheries.

Hydrography and Fish Concentration. Although one can easily make serious mistakes by assuming too precise regulation of fish abundance by temperature in particular cases, the general correlation between particular types of bottom temperature conditions and abundance of various kinds of groundfish is indicated in many parts of the area.

Haddock on the Grand Bank in March and April 1948 were in deeper water than in 1947 corresponding with colder water than in 1947 being present in the shallower depths in 1948. The haddock were present in numbers in the warmer deeper water. On

St. Pierre Bank the spring fishery for haddock is unusually deep often in the vicinity of 90-95 fathoms while the Grand Bank spring haddock fishery is usually at 50 to 60 fathoms. In both areas during the Spring and in June the greatest quantities of haddock are in the water several degrees above zero centigrade a few fathoms below the zero centigrade layer which extends much deeper on St. Pierre Bank than on the Grand Bank.

Cod are available throughout spring, summer and autumn in water of one or two degrees centigrade situated at about 100 to 120 fathoms, below the layer of cold Arctic water below zero centigrade on the northern and eastern slopes of the Grand Bank. The below zero water appears to act as a partial barrier although it is apparent that at times especially after spawning some of the cod break through the overlying cold layer and mount into the warmer layer above. There is much investigation needed here as the amount of this breaking through after spawning may determine the extent of the fishery inshore and on the shallower parts of the bank.

American Plaice are found in numbers on the eastern Grand Bank in water ranging from -1.2 to +1.1° Centigrade.

Exploratory Fishing. Successful explorations have been carried out for haddock on St. Pierre Bank and on the Grand Bank. The finding of haddock on the Grand Bank from February to June generally offers no difficulty as it is usually only necessary to try between the 45 and 70 fathom contours on the south west edge of the bank where the bottom is exceedingly smooth. Explorations along the northern and eastern slopes of the Grand Bank have shown good populations of cod in a number of areas, sometimes below the cold layer and sometimes in the upper part of the cold layer. Large populations of American plaice of commercial size have been shown to exist all along the eastern slopes of the Grand Bank. The plaice and cod populations are now being actually exploited by local trawlers, many millions of pounds having been taken from the eastern Grand Bank area during the past two years. The presence of rosefish has been demonstrated in deep water all along the south western edge of the Grand Bank, the western edge of St. Pierre Bank, the south coast of Newfoundland west of Fortune Bay, the west coast of Newfoundland north to Port Saunders, and north of Anticosti Island. In several of these areas large quantities of rosefish are present. In one of the areas, Hermitage Bay, over seven million pounds of rosefish have been taken since its discovery by the Investigator II in 1947.

Haddock Losses in Commercial Trawling. Measurements in 1949 at sea and on shore during four trips of commercial trawlers have shown numbers of haddock discarded at sea of 47, 32, 71 and 49 percent of the total catch. Varying percentages of the haddock below 50 centimetres were discarded.

Otolith Weights and Lengths as Indices of Distinct Populations of Fish. An apparently new method has been developed of distinguishing between fish populations by means of otolith weights. Using this method it has been found possible to distinguish between the Grand Bank and St. Pierre Bank populations of haddock, the Grand Bank haddock having heavier otoliths, and between the inshore St. John's and offshore southern Grand Bank populations of cod, the St. John's cod possessing considerably heavier otoliths. In haddock from the Grand Bank area the otoliths of the males are heavier than those of females of the same length. In both cod and haddock the otolith length decreases greatly relative to the length of the fish with increasing size.

Vertebral Averages. The vertebral averages of haddock samples from St. Pierre Bank and the Grand Bank cover approximately the same range so that the vertebral averages are not a good weapon for studying the differences and migrations in schools of haddock in the Newfoundland area. The vertebral averages in the Newfoundland area are approximately one vertebra lower than that of the neighbouring Nova Scotian banks.

In cod the vertebral average is of very practical use in studying the distinctness or otherwise of the various cod populations and for indicating mixing and migration in the Newfoundland area. Differences in vertebral averages between 54.479 and 52.146 occur. High vertebral averages mostly above 54 are found in Labrador, on the east coast of Newfoundland, and to the north of the Grand Banks. The lowest vertebral averages, between 52.146 and 52.903, are found in cod populations on the south east tip of the Grand Bank. Averages are below 53.3 on the south west edge of the Grand Bank and below 53 on the southern part of the west coast of Newfoundland. Elsewhere in the area vertebral averages intermediate between the high and the low are found.

Survival of Haddock Year Classes. On the Newfoundland banks the dominating year class at present, providing in numbers almost seventy per cent of the commercial catch at St. Pierre Bank, is the 1942 year class. A new year class, the 1946, is showing promise. The 12 to 15 year old fish are numerous on St. Pierre Bank but very scarce on the Grand Bank. On these banks there are many extremes of survival, some years such as 1944 and 1945 on both banks and 1939, 1940 and 1941 on St. Pierre Bank, showing a survival of only one to three per cent that of a very good year such as 1942. The variations in year classes in the different areas are of use in showing migration or lack of migration between areas.

Tagging. A Belly tag has been used in cod tagging with better success in the second year than the more usual cheek tag. Over 4300 cod and 300 haddock have been tagged during the past three years. There have been no returns of haddock tagged from ordinary otter trawl catches. The general picture from the cod tagging is that these fish move little along the coast during the summer months and the great movement is off to deep water in the

autumn to a spawning area for spawning in May and June and a considerable almost immediate dispersal after spawning. Many cod near the west coast of Newfoundland in the Gulf of St. Lawrence migrate out of the Gulf to banks off the western part of the south coast in the late autumn and early winter and back again in the spring. Many cod from the western side of the Grand Bank and from St. Pierre Bank migrate inshore but inshore migration would be quite unusual from the south eastern part of the Grand Bank.

Data and materials collected but not yet worked up. A large amount of data and materials, including sex, sexual maturity and spawning data for 4000 haddock and 7000 cod, stomach contents of 6000 cod, otoliths for 6000 cod, measurements of 64000 haddock and 51000 cod and length weight relationship of 3000 haddock and 3000 cod have not yet been worked up sufficiently for summary reports to be given.