

INTERNATIONAL COMMISSION FOR



RESTRICTED
THE NORTHWEST ATLANTIC FISHERIES

Serial No. 1669
(D. c. 9)

ICNAF Res. Doc. 66-60

ANNUAL MEETING - JUNE 1966

Changes in the Atlantic halibut fishery (*Hippoglossus hippoglossus* L.) 1954-1964.

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Statistics of the halibut fishery in the northwest Atlantic show changes in amounts landed, area, and type of fishery. The data used in the accompanying figures have been printed in the ICNAF Statistical Bulletins for the years 1954 to 1963. For the 1964 data, preliminary statistics from ICNAF documents for the 1965 Annual Meeting have been used. Swordfish data were taken from unpublished records at the St. Andrews Biological Station.

The Canadian fishery for halibut is concentrated in Subareas 3 and 4 of the ICNAF Convention Area. Total landings for all countries for these two subareas are shown in Fig. 1A. From 1954 to 1960 there were increasing landings from the area, with a high of 5,480 metric tons in 1960. In 1960 these landings were divided almost equally between Subareas 3 and 4. From 1960 until 1963 landings decreased, the decrease being mainly in Subarea 3. A slight increase from Subarea 3 is shown again in 1964.

Figure 1B shows that Canadian halibut landings have also fluctuated in the northwest Atlantic during 1954 to 1964. The Maritimes and Quebec landing statistics have been selected here since the fishery for halibut is pursued by Maritimes fishermen. Newfoundland landings made up only about 10% of the total Canadian catch until 1962, and the majority of these landings were incidental catches from boats fishing for other species. Maritimes and Quebec landings reached a high plateau between 1957 and 1960 of around 3,700 metric tons. About 30% came from Subarea 3. Since 1960 these landings have gradually decreased until in 1964 a total of 1,978 metric tons was recorded as landed on the Canadian mainland, of which 11% came from Subarea 3.

Since the fishery specifically for halibut is carried out by longline, the Maritimes and Quebec landings, broken down by type of gear, were examined (Fig. 2A, 2B). For Subarea 3 (Fig. 2A) longline landings reached a peak

in 1958 and dropped off gradually to 1961. In 1962 the longline landings decreased further to about half the 1961 values, and continued to fall until only 184 metric tons were landed from Subarea 3 by this gear in 1964.

Maritimes and Quebec landings from Subarea 4 show the same trends but have not fallen to such low levels (Fig. 1B). Longline fishing for halibut has been separated from longline fishing for other species in Fig. 2B.

Although the peak halibut landings in total occurred in 1957, the peak landings by boats fishing specifically for halibut did not occur until 1960. At this time, 1,772 metric tons were attributed to boats fishing for halibut. This diminished to 738 metric tons in 1964.

One reason for the drop in halibut landings in the Maritimes has been the newly developed pelagic longline fishery for swordfish. This fishery which began late in the summer of 1962 has attracted many of the vessels that formerly fished halibut throughout the summer. Swordfish landings from the ICNAF area fluctuated around 2,000 metric tons from 1954 to 1962 (Fig. 2C) and almost all these fish were taken by harpoon. In 1963 and 1964 the new longline fishery for swordfish expanded greatly. Landings from longlining were 7,840 metric tons in 1963 and 6,856 metric tons in 1964. By 1964, harpoon landings had dwindled to 128 metric tons. The diversion of effort from halibut fishing to swordfish longlining was undoubtedly the main reason for lowered halibut landings.

Pressure is exerted on the halibut stocks in Subareas 3 and 4 by Newfoundland and by countries other than Canada, but their total take is not nearly as great as that by mainland Canada. Landings for these groups from

Subarea 3 increased from 1954 to 1960 (Fig. 3A) when about 1,500 metric tons were landed and over half of this by longline fishing. The growth of the line component in these landings was due to an increase in activity of Norwegian longline vessels. In the period 1960 to 1963, total landings dropped, due mainly to a decrease in the Norwegian fishery, although the otter-trawl component became more important. A relatively large total landing is shown for 1964 for which the division between line and otter trawl is not yet available. However, data on division of the catch between countries and knowledge of their usual type of gear fished indicate the increase is mainly in incidental otter-trawl landings.

Halibut landings from the same countries operating in Subarea 4 have increased over the whole period (Fig. 3B) with a new high reached in 1964. The line component of these landings is mainly fishing by Newfoundland in the northeastern Gulf of St. Lawrence. The large increase in 1964 landings again may represent an increase in the incidental catch by European trawlers on the Nova Scotia banks.

This summary of statistics shows the changing effort and types of effort affecting the halibut fishery. To generalize on what effects these changes might have on the halibut stocks, we should also know what sizes of fish are involved in these landings.

Sizes of fish landed by otter-trawl and longline units

Differences in sizes of fish caught by longline and otter trawl have been shown elsewhere (Kohler, 1966). Length compositions of fish landed from the two gears (Fig. 4) illustrate the well known fact that longline catches contain much bigger fish than otter-trawl catches. One reason is that the No. 6283 Mustad hooks used by Canadians for longlining halibut are too big to fit easily into the mouth of small fish.

A second reason may be the selective feeding by small halibut which have been shown to prefer invertebrates (Kohler, 1966). Longline vessels use fish (mainly herring and "trash" fish) in their catch almost exclusively as bait for halibut. A third reason may be differential distribution of sizes of halibut on the banks, with the smaller fish tending to remain on the shoaler grounds that are fished regularly by otter trawl while the larger fish tend to be on the deep edges of the banks where the longline fishing for halibut generally takes place.

It has been shown that most halibut are not mature until they reach 100 cm in length (Kohler, 1966). Thus the majority of halibut landed by otter trawl (Fig. 4) will be immature fish. A large portion of the longline fish are over 100 cm in length and are probably mature at this size.

Effects of changes in the fishery on halibut stocks

With the available data, we may speculate only very generally on the effects of the fishery on halibut stocks since 1954. McCracken (1958) indicated that the approximate long-term annual average of landings of halibut from ICNAF Subareas 3 and 4 was of the order of 5 million lb and that fluctuations in this were related mainly to changes in the magnitude of the Canadian fishery. From 1954 to 1964, landings have been above this long-term average. Canadian mainland landings have gone down but there were increased landings by other fleets. However, the type of pressure exerted by these other units is in the main different from that exerted by the Canadian vessels which now leave the halibut fishery seasonally in favour of the swordfish fishery. At present there seems to be an increasing pressure on the stocks by otter trawl rather than by line fishing (Fig. 2B, 3).

If this trend continues, assuming that all otter trawlers tend to select like sizes of halibut, there may be some detrimental effects on survival of spawning stock since the otter trawlers take a much greater percentage of immature fish than the longliners. To say how great these effects may be would be speculative at present since we know practically nothing about spawning and recruitment of halibut stocks in the northwest Atlantic. If the halibut fishery is to continue to be an important source of economic return to fishermen, this aspect of the biology of halibut and the effect of the fishery on it should be thoroughly investigated soon.

References

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- McCracken, F. D. 1958. On the biology and fishery of the Atlantic halibut (Hippoglossus hippoglossus L.).
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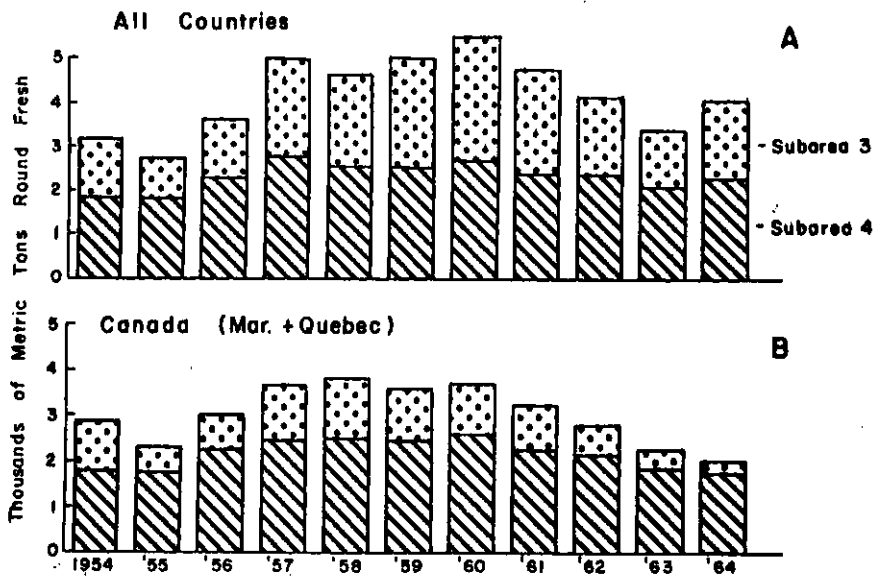


Fig. 1. Landings of halibut in ICNAF Subareas 3 and 4.

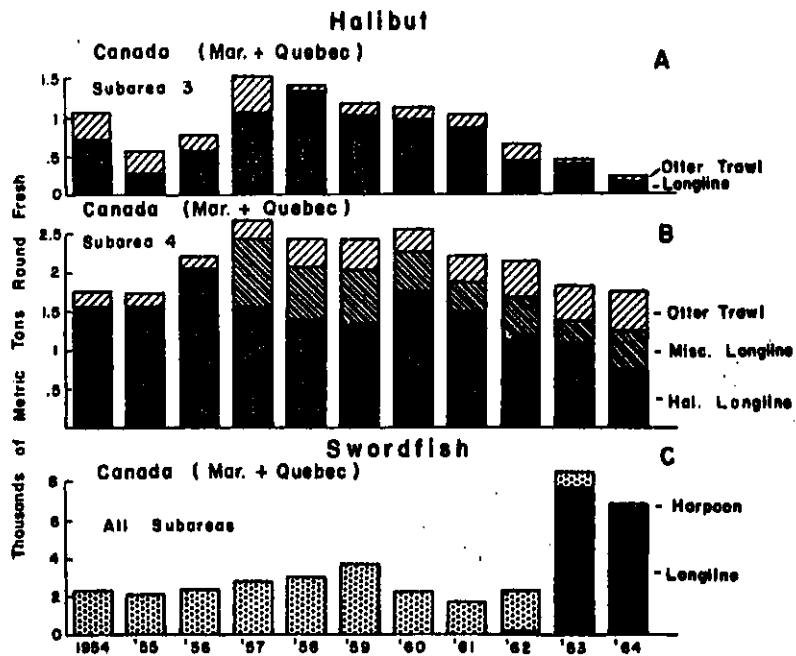


Fig. 2. Canadian (Maritimes and Quebec) landings of halibut and swordfish by type of gear.

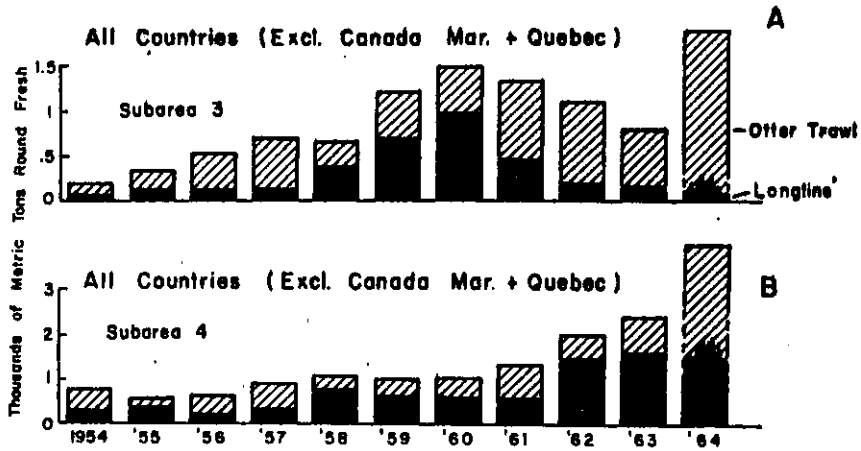


Fig. 3. Landings of halibut elsewhere than on the Canadian mainland (Maritimes and Quebec).

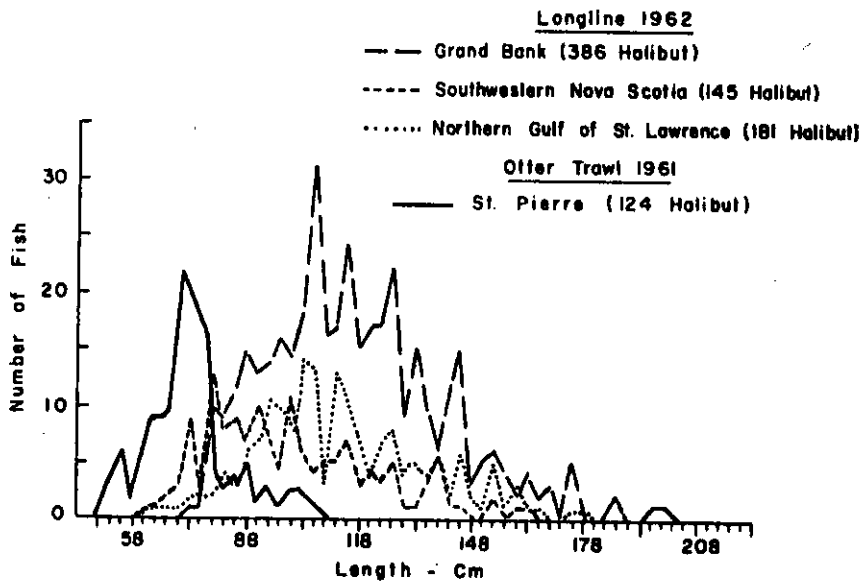


Fig. 4. Length composition of halibut landings.