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Occurrence of American plaice (*Hippoglossoides platessoides*) at Non-habitual Depths in the Northwest Atlantic, 1990–93

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Abstract

In 1992 and 1993 American plaice (*Hippoglossoides platessoides*) was detected in the catches of the Spanish fleet at depths greater than those habitual to the species (>800 m). The maximum depth was registered in Div. 3L at more than 1 400 m. The maximum yields of this species at depths over 800 m were observed in Div. 3N.

The presence of American plaice at great depths was mainly detected in the first half of the year, and most predominantly at the end of winter and beginning of spring. No clear relationship between the length distribution and the depths reached were observed.

Key words: A. plaice, depth, length distribution

Introduction

A review of published literature indicates that the habitat of the American plaice (*Hippoglossoides platessoides*) is found over soft bottoms in a depth range of between 10 and 400 m in the Northeast Atlantic (Nielsen, 1986; Quero, 1984) and between 20 and 390 fathoms (37–715 m) in the Northwest Atlantic (Scott and Scott, 1988). On the Grand Bank, particularly in Div. 3L, American plaice have not been observed to migrate north to the deeper waters. In the Gulf of St. Lawrence, however, movements towards deeper waters have been detected in winter, where the fish remain until April. (Scott and Scott, 1988)

In the NAFO Regulatory Area, since 1990 Spain has been developing a new trawl fishery with Greenland halibut as the target species, at depths of over 800 m (Junquera *et al.*, MS 1992). This fleet trawled at up to 1 800 m in depth in 1993. In 1990 the working area of these trawlers was limited to the northern region of Flemish Pass, but this area has been extended year by year, and can now be considered to cover the whole of the continental slope in the Regulatory Area, from 800 m and up to a maximum limit which now reaches 1 800 m in some areas.

Along with the development of this fishery, an observer program was established in 1990 to place observers onboard the Spanish trawl fleet directed at fishing Greenland halibut, to collect information on catches including discards, effort, length distributions and biology of species. Of particular interest were the unusual records of American plaice in deep water. In this study, the catches of American plaice in the fishery are analyzed, particularly with reference to their distribution and biological characteristics.

Materials and Methods

The information on catches and effort corresponding to a total of 159 000 hours trawling (39 000 hauls) in the second half of 1990 and 1991, and the whole year in 1992 and 1993 was collected by observers on board the Spanish trawl fleet directed to Greenland halibut. Although the target species of this fleet was not American plaice, it was believed that this yield (kg per trawling hours) can provide information on the presence, and temporary concentrations, of this species at deep strata.

For this reason 4 depth strata were established; one for hauls at depths between 800 and 999 m, the second corresponding to hauls at depths between 1 000 and 1 199 m, the third for those between 1 200 and 1 399 m and the fourth stratum for hauls made at depths of 1 400 m and over. The yield for each depth stratum and month was then calculated as the total catch of American plaice in the stratum and month divided by the total number of trawling hours in that stratum and month.

Trawling time was calculated as the difference in minutes between the moment when the operation of shooting of the net was finished and the moment when the net haul-back began.

The yields obtained were compiled with the aim of observing their occurrences through the period of the fishery each year. In those hauls in which a significant number of specimens occurred, lengths by sex were measured rounded down to the nearest cm. With these, the length distributions were obtained of the catches in the depth strata for the months in which higher bathymetric dispersion was detected in each Division. These months were February in Div. 3L and April in Div. 3N. The data were analyzed to determine whether patterns existed in the displacement of the different length groups.

The length distributions of the two sexes were treated separately, given that this species presents sexual differences in growth.

Results and Discussions

The presence of this species was not detected in the depth strata of this study in neither 1990 nor 1991. In the winter months of 1992 and 1993 American plaice was, however, detected at over 800 m of depth in the three Divisions analyzed (Fig. 1–3). It was also detected at depths over 1 400 m in Div. 3L (Fig. 1). This pattern bears similarity to the migratory scheme described by Scott and Scott (1988) for American plaice in the Gulf of St. Lawrence. When the years 1992 and 1993 were compared, it was observed that the phenomenon was much more intense in 1993 with higher yields being obtained in all Divisions. Similarly, in 1993, the presence of American plaice at depths over 800 m was detected in a more protracted period than in 1992 with occurrences extending into more months (Fig. 1–3).

The length distributions of the catch by Division and depth strata indicated that specimens from Div. 3N were slightly larger than those from Div. 3L for the same depth strata (Fig. 4 and 5).

In both Div. 3L and Div. 3N the larger females were distributed in the stratum from 1 000 to 1 199 m. In the case of males there did not seem to be a clear pattern in the length/depth relationship.

The absence of American plaice in the catch of the Spanish fleet targeted at deep water species in the years 1990 and 1991 may have been due, at least in part, to the fact that during these years observers were only present in the second half of the year. As can be seen in Fig. 1 to 3, the phenomenon observed in 1992 and 1993 seemed to occur mainly in the first half of the year, and the lack of observers during this period may have prevented detection. This same problem could also have affected the results from Div. 3N in 1992, since, as mentioned previously, the fleet first began working in the northern area of Flemish Pass, and the working area gradually expanded towards the south. In the first half of 1992 the fleet worked very little in Div. 3N and so the information available was scarce (there were only 3 hauls studied by the observers).

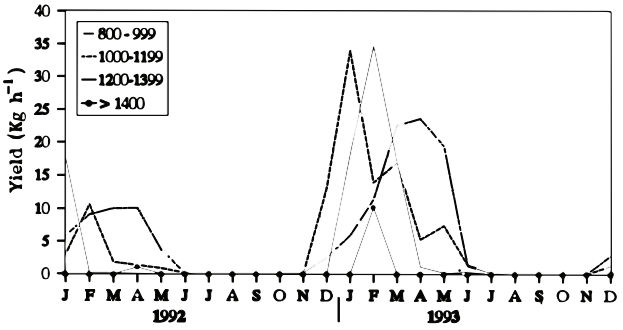

Fig. 1. Catches of American plaice by depth strata by Spanish deep water trawlers in NAFO Div. 3L.

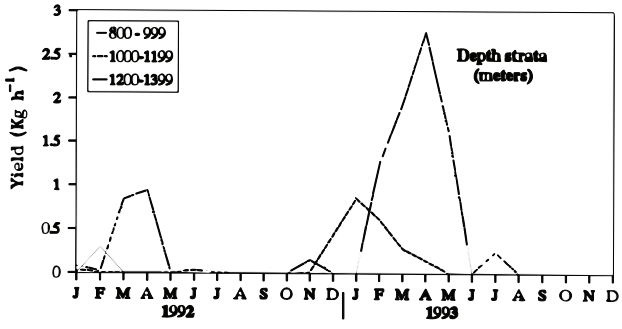

Fig. 2. Catches of American plaice by depth strata by Spanish deep water trawlers in NAFO Div. 3M.

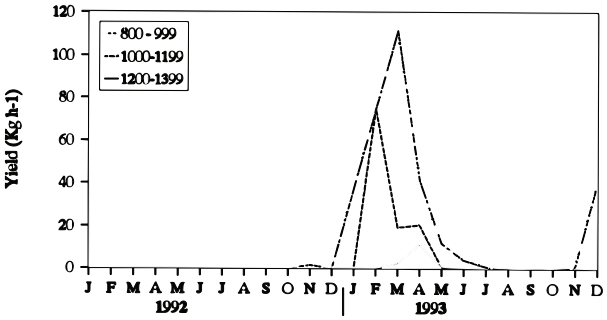

Fig. 3. Catches of American plaice by depth strata by Spanish deep water trawlers in NAFO Div. 3N.

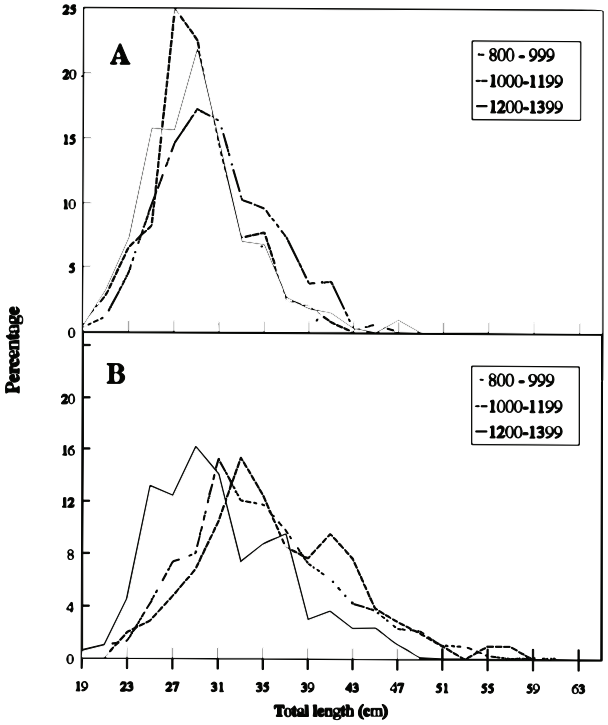

Fig. 4. Length distribution for (**A**) male American plaice and (**B**) female American plaice by deep strata in NAFO Div. 3L, February 1993.

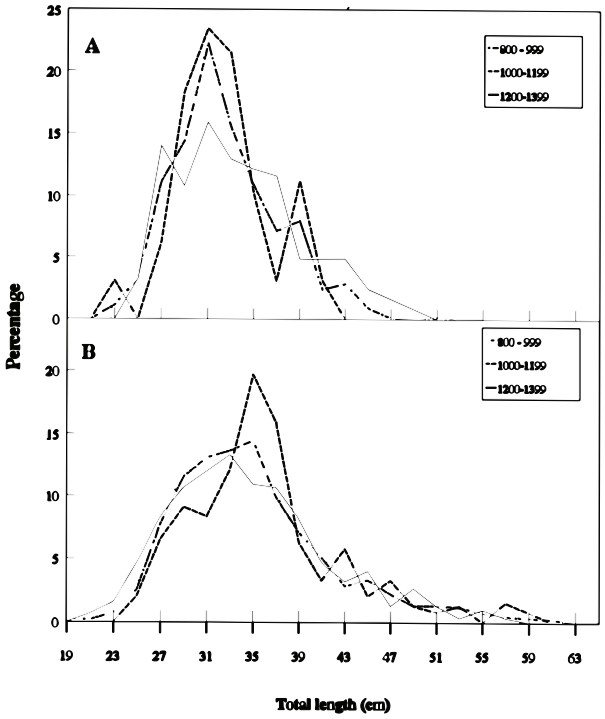

Fig. 5. Length distribution for (**A**) male American plaice and (**B**) female American plaice by deep strata in NAFO Div. 3L, April 1993.

This Division has been frequented habitually by the fleet since the second half of 1992.

In conclusion, the observations present a record of occurrence of American plaice at depths greater than the limits observed in the literature for this species. While the observer coverage was not adequate to confirm this distribution in 1990 and 1991, data collected in 1992 and 1993 showed conclusively that American plaice occurred at depths over 800 m in the Flemish Pass area in Div. 3L, 3M and 3N, in the winter months. The deepest occurrences, at over 1 400 m, occurred in Div. 3L.

Further investigations are however, needed to understand whether this phenomenon was unusually caused by the unusual cold period in Newfoundland area or if it is an annual behaviour of these stocks.

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Discussions

Question: Is the presence of American plaice in deep strata during the winter month of 1992 and 1993 due to the anomalous oceanographic conditions?

Response: Really, we have no data to answer this question, because the sample covers only these two years in winter. However, it appears to be the case. Historically, concentrations of American plaice were detected in the deeper strata of the Canadian cruises during the cold mid-1990s.

Question: Could this shift in the distribution affect the survey index in the spring series?

Response: It has been commented that it has probably little effect on this index.

Comment: (1) This phenomenon has been newly detected in February 1994 in the Canadian deepwater survey in Div. 2J+3LMN.

Comment: (2) It is not clear what American plaice do at these depths taking into account that on one hand that this species tolerates low temperatures very well, on the other hand, the specimen found up to 800 m does not present sexual activity and it's stomach was empty.