

STOCK STATUS REPORT

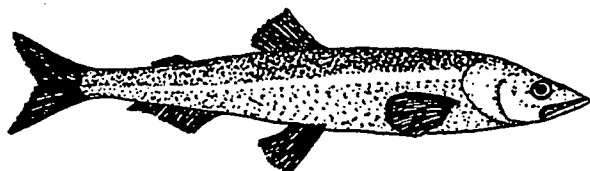
LAURENTIAN REGION

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CAPELIN IN THE GULF OF ST. LAWRENCE



BIOLOGY

The capelin (*Mallotus villosus*) is a relatively small cold-water fish with a circumpolar distribution. On the east coast of North America, the capelin is found along the Labrador and Newfoundland coasts, on the Grand Banks and in the Estuary and Gulf of St. Lawrence. Its distribution extends to Nova Scotia, and occurrences are occasionally reported as far south as Cape Cod. The capelin is rarely found in Nova Scotia. It was extremely abundant in the Bay of Fundy in the 1960s and, since the mid-1980s, has been observed again in the eastern portion of the Scotian shelf. These two episodes occurred during periods when the water temperature was abnormally cold.

Capelin spawn around three years of age and may live five or six years. Spawning takes place on the beach or in deeper waters. In the first case, the capelin literally "roll" on sand or fine gravel beaches, while in the second, reproduction takes place at depths of 30 to 125 m (17-70 fathoms). This type of reproduction occurs in particular on the Grand Banks of Newfoundland and possibly in certain parts of the Estuary and Gulf of St. Lawrence. In Newfoundland, the spawning season generally begins on the south coast around the beginning of June and then progresses northwards, occurring around mid-July on the Labrador coast. On the west coast of Newfoundland, spawning on the beach takes place sporadically due to the sometimes rapid rise in water temperature. The beach-spawning period lasts about four to six weeks. In the rest of the Gulf of St. Lawrence, spawning moves from west to east. It has been observed as early as mid-April on the north shore of Ile aux Coudres and around mid-July on the Lower North Shore of

Quebec; it takes place in June and July along the coast of the Gaspé Peninsula. A large number of capelin die after spawning, particularly the males, which are injured in repeated matings on the beach. However, a number of them survive and can spawn several times again. The capelin eggs adhere to the gravel. The incubation period varies with water temperature. The larvae quickly adopt a pelagic lifestyle and remain near the surface until winter. The size of recently hatched larvae varies from 3 to 6 mm and is 2 to 4 cm at the beginning of the first winter.

Capelin growth during the first year is identical for males and females; however, it becomes more rapid among males beginning in the second year and remains so (Figure 1).

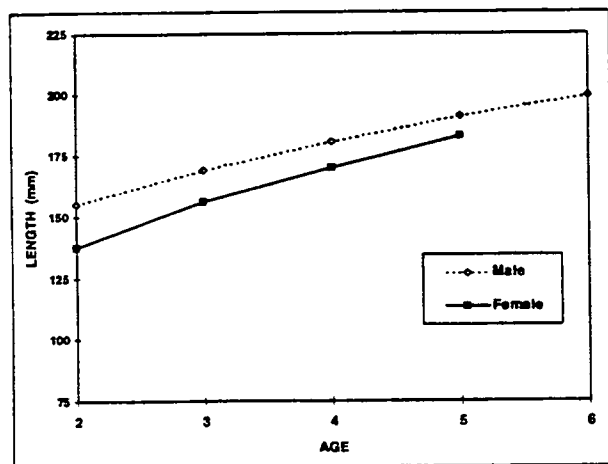


Figure 1. Mean length (mm) at age for the capelin of the Estuary and Gulf of St. Lawrence.

Most of the growth in capelin takes place during the second and third years. Most capelin become mature and begin spawning at the age of three years. Their growth may be affected by factors such as water temperature. The capelin feeds mainly on plankton and its feeding activity

is mostly seasonal. For example, feeding stops completely during spawning, then gradually resumes. Capelin is a very important link in the food chain. It is a major prey of certain species of fish, such as cod and salmon, and some sea birds and marine mammals.

Various groups of capelin have been observed in the Estuary and Gulf of the St. Lawrence. Although the capelin's population structure has not been clearly ascertained, the resource is now managed according to three distinct management units, namely NAFO Divisions 4R, 4S and 4T (Figure 2).

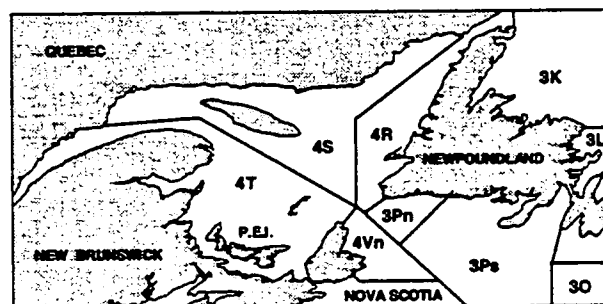


Figure 2. Map of the NAFO Divisions.

DESCRIPTION OF THE FISHERY

Commercially, capelin has not been a much sought-after species in eastern Canada. Traditionally, capelin has been used basically as farm fertilizer, for human consumption, as bait for cod and, more recently, for production of fish meal. Because of fluctuating markets, capelin landings in 4RST have varied widely in recent years (Figure 3).

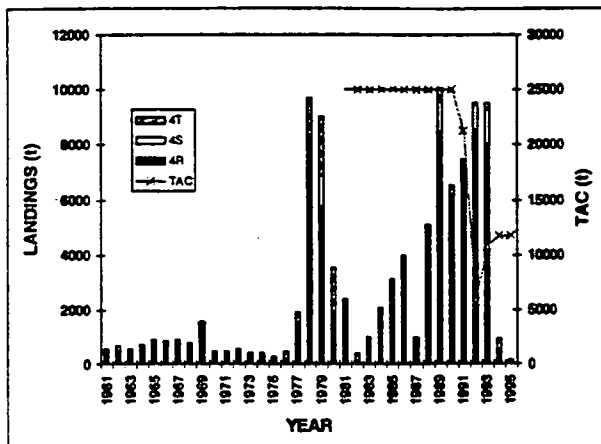


Figure 3. Landings (t) of capelin in NAFO Divisions 4R, 4S and 4T.

Prior to 1977, annual landings were stable at under 2,000 t. The recent opening of a Japanese market for roed females has attracted the attention of Canadian fishermen. The demand generated by this market has been responsible for a rapid increase in landings, which stood at nearly 10,000 t in 1978 and 1979 and rose to a similar level between 1989 and 1993 (Figure 3). The capelin fishing season is short and corresponds to the pre-spawning period for the purse-seine fishery and the spawning period for the trap fishery. In both cases, the fishery targets mainly mature females for the gonad market.

The largest landings in the entire Gulf of St. Lawrence almost always occur on the west coast of Newfoundland in Division 4R (Figure 3). The TAC for the division is now 10,000 t compared to 1,725 t for Divisions 4S and 4T combined. The most intensive fishing period in Divisions 4R and 4S is generally in June and July. In Division 4T, the fishery sometimes begins as early as April, but the largest landings occur in May and June. The gear used for

the majority of capelin landings is purse seines, traps and weirs.

The fishery in 1995

Because of the premature closure of the fishery, due to the small size of capelin, landings of this species in 1995 were only 152 t, the smallest value recorded since 1961. More than half of these landings (90 t) were fished in Division 4S alone. Fixed gear (traps and weirs) was used for all of the landings. The opening of the fishing season has been delayed on the Lower North Shore of Quebec and the west coast of Newfoundland in each of the past three years. A decline in the average size of capelin has also been observed. Another effect of this decline is an increase in the number of capelin per kilogram. The market for roed female capelin permits a maximum of 50 capelin per kilogram. This criterion has become a management measure over the years and was used to close the fishery in 1995. However, there seems no biological foundation for such a measure.

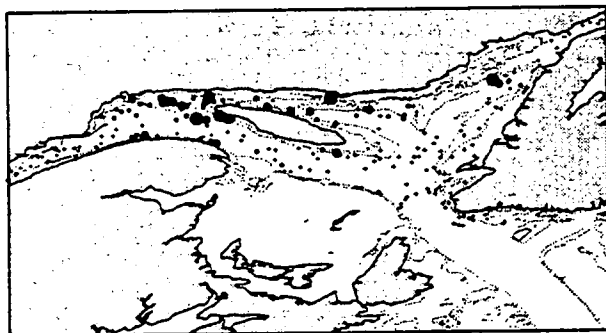
Capelin by-catches

From 1990 to 1995, 100 to 600 different vessels were sampled by observers in the Estuary and Gulf of St. Lawrence, representing between 2,000 and 9,000 sets/year. Capelin was present in 6 to 16% of the sets per year. Most of the sets came from the shrimp fishery; Nordmore grates were gradually added, beginning in 1993, to the bottom trawls used in that fishery. The main species caught with the capelin were shrimp, redfish and cod. The largest capelin by-catches were observed in at least five regions of the Estuary and Gulf of St. Lawrence. These regions are closely associated with shrimp, cod and redfish fishing sites.

Because of the moratorium on cod and redfish, capelin by-catches were taken mainly by shrimpers. They are estimated to have caught 600 t annually of capelin by-catches. The Nordmore grate, which cannot completely exclude capelin, at least reduces the catch. Capelin is not the only by-catch of shrimpers, cod fishermen and redfish fishermen. They also catch a large number of species of for now marginal commercial importance.

ABUNDANCE INDICES

Every year, in August and September, a research survey has been carried out by bottom trawling in the northern Gulf of St. Lawrence to assess the groundfish and shrimp biomass. A shrimp trawl is used and, since 1990, the survey has been conducted aboard the Alfred Needler research trawler. The capelin by-catches that occurred during the 1995 survey are presented in Figure 4.



LEGENDE : (kg / set of 20 minutes)
 · [0 - .09] · [0.1 - 0.99] • [1 - 9.99] ● [10 - 99.99]

Figure 4. By-catches of capelin from the Alfred Needler 1995 summer survey.

As was the case during previous surveys, the largest catches came from the area between Sept Iles and Anticosti Island

and north of the Esquiman Channel, on the west coast of Newfoundland.

Average weight per set

Two abundance indices were calculated from the Alfred Needler data. The first is the average weights of capelin per set. Despite a wide variability, there has been a downward trend in weights in the past three years (Figure 5). The highest average weights per set have always been observed in Division 4S.

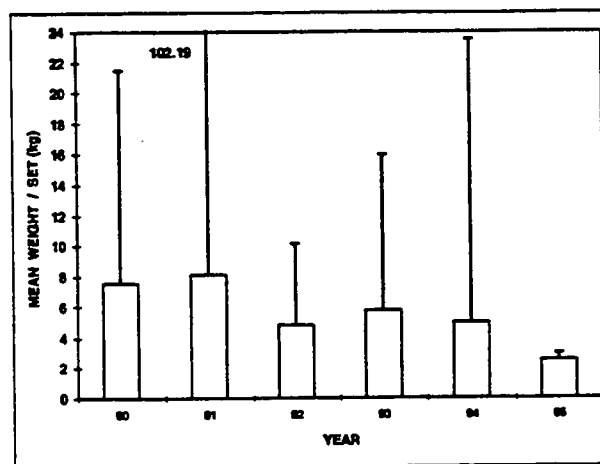


Figure 5. Mean weights (kg) per set from the Alfred Needler surveys (vertical lines are the upper limits of the corresponding weights).

Occurrence Frequencies

The second abundance index is simply the percentage of sets in which capelin is present. Once the index is adjusted to take into account the fact that there are a number of different sets per unit of sampled area, it also shows a downward trend for the past three years (Figure 6).

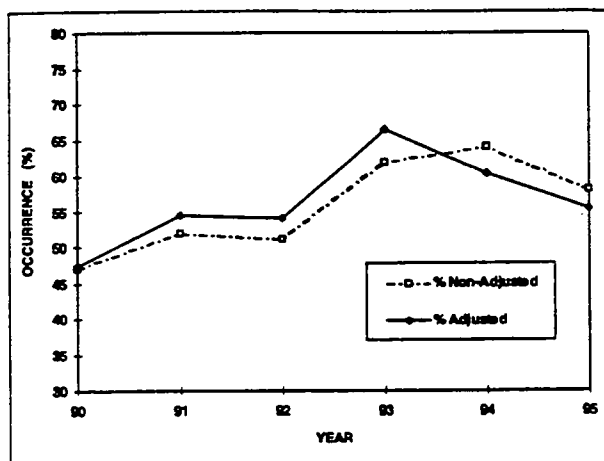


Figure 6. Capelin frequencies of occurrence from the Alfred Needler surveys.

ASSESSMENT AND PROGNOSIS

Information from the industry

As in 1994, specific information on capelin by-catches was provided by the Index Fishermen Program for the shrimper fleet. In 1995, the total number of trips made by each of the 15 participants varied between 3 and 25, and they averaged five to six days each. The largest by-catches were made south of Anticosti Island and in the northern part of the Esquiman Channel. The average number of sets per trip generally varied from 15 to 20 and capelin were present in 15 to 50% of the sets. In most cases, capelin catches and yields per set or per hour varied between 0 and 10 kg and 0 and 0.9 kg respectively. They are larger in the spring and fall, and there is no relation between the catches and yields and the fishing effort. When capelin was present at the beginning of the season, the sets were made throughout the day. The average fishing depth increased and the number of sets per day decreased over the course of the season. Towards the end of the season, only three

sets were made each day, at 5 am, 10 am and 3 pm. No difference was found between night and day capelin yields, and no relation has been established between capelin and shrimp yields.

Approximately a dozen capelin fishermen from the Lower North Shore of Quebec also participated in the Index Fishermen Program in 1995. Landings by these fishermen were small, not because of a lack of resource, but due to undersized capelin. Another reason invoked by some of these fishermen that capelin was present only offshore, rather than near the shore.

Conclusion

Smaller capelin, a delay in the opening of the fishing season, colder waters, the premature closure of the fishery and the presence of capelin on the eastern Scotian shelf were the most important factors in 1995. Closure of the fishery also meant a smaller number of samples for laboratory analysis. In such circumstances, it becomes difficult to follow changes in some biological parameters or to calculate abundance indices based on fishing statistics. Although abundance indices are available that do not depend on the fishery, such as those from the research survey, these must be interpreted cautiously because the survey uses a bottom trawl. Although the survey was not designed to estimate the biomass of pelagic fish such as capelin, it does provide abundance and distribution indices for capelin in the Gulf of St. Lawrence.

For more information:

Grégoire, F., Lévesque, C. and H. Bouchard. 1996. La situation du capelan (*Mallotus villosus*) de l'estuaire et du golfe du Saint-Laurent en 1995. DFO Atl. Fis. Res. Doc. 96/54.

Grégoire, F., Hurtubise, S., Archambault, D., Morneau, R. and H. Bouchard. 1995. Analyses des données de pêche et de recherche sur le capelan (*Mallotus villosus*) du golfe du Saint-Laurent. DFO Atl. Fis. Res. Doc. 95/55. 64p.

Grégoire, F., and S. Hurtubise. 1996. Les prises accessoires de capelan (*Mallotus villosus*) dans le golfe du Saint-Laurent entre 1990 et 1995. DFO Atl. Fis. Res. Doc. 96/55.

Hurtubise, S. 1993. Fishery and biological characteristics of the capelin (*Mallotus villosus*) in the Gulf of St. Lawrence 1984-1992. Can. Ind. Rep. of Fish and Aquat. Sci. 219: vi + 25p.

Jangaard, P. M. 1974. The capelin (*Mallotus villosus*): biology, distribution, exploitation, utilization and composition. Bull. Fish. Res. Board Can. 186E: 70p.

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