Atlantic herring *(Clupea harengus)*

Common Names: Sea herring, midge herring, sardine, bloater or kipper(Smoked).

Description, Distribution and Biology

Atlantic herring is a pelagic (mid and upper water column) schooling fish from the family Clupeidae. It has an elongated, laterally compressed, streamline body, with a deeply forked tail and single dorsal fin. Its scales are large, loose and cover the entire body. Atlantic herring has iridescent blue-green backs, shading to silver sides on its sides and abdomen, providing camouflage in the open ocean (Fig. 1). Maximum size attained for both male and female is approximately 43 cm in length and 0.68 kg.

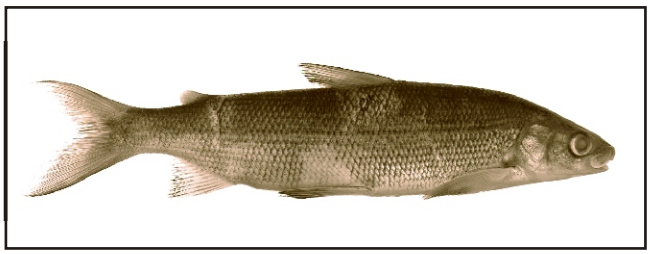

Figure 1. Atlantic herring. Source: Department of Fisheries and Oceans, Canada.

Atlantic herring is distributed throughout the North Atlantic in temperate waters (1-18°C) at depths between 0 and 200 m (Fig. 2). In the northeastern Atlantic it ranges from Iceland to the White Sea and southward to the Strait of Gibraltar. In the west Atlantic this species can be found from Greenland to Labrador as well as Cape Hatteras, USA. Commercial quantities of herring are commonly found off the southern coast of Labrador, in the Gulf of St. Lawrence and Bay of Fundy, and in coastal and bank areas around Nova Scotia. In addition, there are five distinct stocks of herring distributed along the east and southeast coasts of Newfoundland: White Bay-Notre Dame Bay, Bonavista Bay- Trinity Bay, St. Mary's Bay-Placentia Bay, Conception Bay-Southern Shore, and Fortune Bay. Herring is known to migrate annually to spawn and feed. Although the structure and migration patterns are not widely understood, each stock prefers particular spawning, feeding, and wintering grounds. In Newfoundland, the five stocks of herring migrate from nearshore spawning grounds to feeding areas in the bays, returning to deeper coastal inlets during the

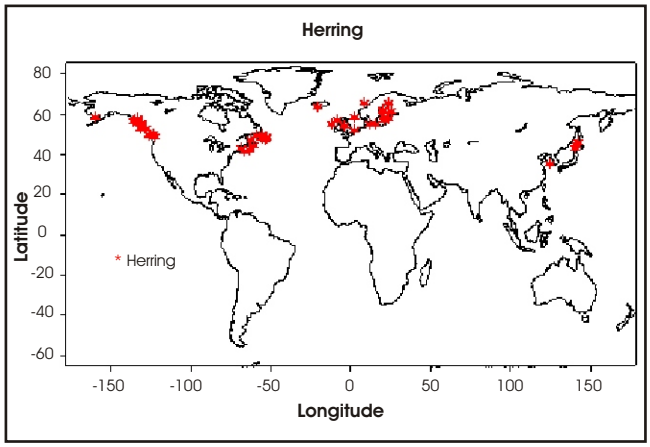

Figure 2. Atlantic Herring Distribution. Source: Ransom A. Myers, Dalhousie University, Halifax, Nova Scotia, Canada.

winter. In contrast to the larger Bay of Fundy and Gulf of St. Lawrence stocks, the herring in Newfoundland bays do not migrate over great distances. Herring generally spend the day in deeper water and rise to the surface at night to feed.

Atlantic herring in the northwest Atlantic Ocean spawn between April and November, depending on stock and environmental conditions. Some stock spawn in the spring while other stock spawn in the summer and autumn. Spring spawning occurs in shallow inshore waters while the summer/autumn spawning takes place in deeper offshore waters in the Gulf of St. Lawrence. Evidence suggests that greater than 70% of herring along the east and southeast coast of Newfoundland spawn in the spring. Females ranging from 25 to 40 cm can produce between 22,000 and 236,000 eggs. Large schools of herring will congregate during the spawning season and release eggs and sperm into the water column. After fertilization, the eggs, which are 1.0 to 1.4 mm in diameter, will sink to the bottom and adhere to objects on the seabed, particularly kelp. Hatching takes place approximately 30 days after fertilization in 5°C water for spring spawners and only 10 days at 15°C for autumn spawners. The newly hatched larvae are 4 to 10 cm in length and grow rapidly. Spring-spawned larvae will undergo metamorphosis to juveniles between August and September. Sexual maturity is reached at 26 cm and by 5 years of age. Atlantic herring typically live 20 years.

Herring are classified as zooplanktivorous filter feeders because they feed predominantly on plankton, such as copepod (red-feed), fish eggs, mollusc and fish larvae, and euphausiids (krill). They also filter small food particles in the water column with their gills. The main predators of herring include squid, dogfish, porbeagle, skate, salmon, cod, silver hake, white hake, mackerel, tuna, sculpin, flounder, seal, porpoise, and whales.

Harvesting and Management

Prior to the mid 1960s, the Atlantic herring fishery off the east coast of Canada was dominated by small inshore boats using gillnets or traps. The catches, particularly in Newfoundland, were low and tended to reflect variations in market demand. By the 1970s, fishing effort and landings increased dramatically as a result of a shift from traditional longlining and gillnetting operations to mobile purse seines. Harvesting in Newfoundland occurs from April to December on both spawning grounds (St. George's and Port-au-Port Bay) and feeding grounds (off St. George's Bay in the spring, north of Point Riche and in the Strait of Bell Isle in the summer, and off Bonne Bay during the autumn) with large (>85 feet) and small (<65 feet) purse seines. Landings for the Newfoundland region averaged 22,492 metric tons (mt) between 1990 and 2001, with an average value of $3,340,000 (Fig. 3). Total allowable catches (TAC) were introduced to the fishery in 1977. Since 1991, the TAC has been estimated at 22,000 mt. In 1994, a catch limit of 5,400 mt was introduced to the St. George's Bay area to protect spring spawners, however the ban was lifted a year later and replaced with a delayed opening in both St. George's Bay and Port-au-Port Bay. Although controlled by TACs, the quota in recent years has not been taken.

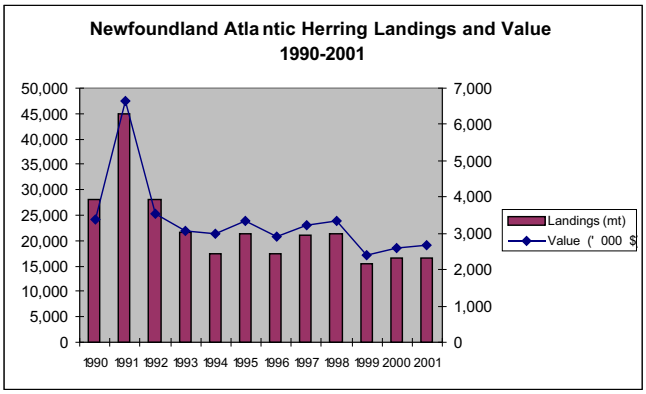

Figure 3. Newfoundland Atlantic Herring Landings and Value 1990 - 2001. Source: DFO Statistics, Canada

Processing and Marketing

Herring has been an important foodfish for centuries, particularly in Europe and Asia. This flavourful, highly nutritious species can be prepared into a variety of products, such as fresh, frozen, cured, canned, smoked, herring roe, and fish meal and oil. In Canada, the most valuable product is herring roe, which is processed for the Japanese market. Salted roe from Pacific herring is highly prized in Japan. Atlantic herring flavoured roe is less attractive to the Asian market and therefore less expensive and used as an everyday snack. Another highly prized delicacy in Japan is herring roe-on-kelp, which is produced naturally when herring deposit eggs on kelp during the spawning season. Over the last 20 years, British Columbia has developed a lucrative herring roe-on-kelp industry in response to the Japanese demand. In 1995, the Canada/Newfoundland Cooperation Agreement for Fishing Industry Development (CAFID) initiated a project to determine the potential of a herring roe-on-kelp industry for Newfoundland. Results of the project suggest there is a potential for a herring roe-on-kelp industry in Newfoundland but further work is required. Frozen whole herring (> 250 g) is the second largest export product with the main markets in Japan and Europe, (United Kingdom). Cured herring products are exported principally to Russia and Poland. After the extraction of roe from the herring the carcases are processed into fish meal for the Canadian aquaculture industry.

The price of herring is directly related to market demand and quality characteristics of the flesh. Quality of the flesh is determined by the amount of fat (higher fat contents receiving better prices). Spring and summer harvested herring have a higher fat content than those captured during the autumn and winter. Fish harvesters in Newfoundland usually receive anywhere from 5 to 10 cents per pound for herring catches.

Constraints and Future Development

Although there are a number of constraints to the Canadian Atlantic herring industry, the two most pressing issues are catch composition and markets. It is difficult for harvesters to obtain large quantities of herring over 250 g. In addition, marketing research and development is inadequate, particularly in addressing potential market niches. Future development of this industry should focus on developing products that are suited for North American consumers. In addition, marketing should promote herring products as a major source of inexpensive and beneficial omega-3 fatty acids. .

ADDITIONAL READINGS:

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The $10 million Fisheries Diversification Program is part of the $81.5 million Canada-Newfoundland Agreement respecting the Economic Development Component of the Canadian Fisheries Adjustment and Restructuring Initiative, announced in August, 1999. The main thrust of the Fisheries Diversification Program is industry-wide research and development initiatives that reflect the economic development priorities of the Newfoundland and Labrador fishing industry.