

Atlantic Mackerel (*Scomber scombrus*)

Common Names: Mackerel, tinker, spikes, and blinkers (small mackerel)

Description, Distribution and Biology

Atlantic mackerel is a small pelagic fish from the family Scombridae, including several species, the most famous being tuna. They have sleek, compact and streamlined bodies designed for fast swimming, with 23 to 33 dark, vertical bands across their upper bodies. The lower side displays a silvery iridescence shading to a white colour on the abdomen. This species is characterized by small eyes, a large mouth with two rows of slender teeth, two dorsal fins, a narrow caudal peduncle (area forward of the tail) with a small knee on either side and small scales (Fig. 1). Male and female mackerel have very similar growth rates with a maximum fork length of about 47 cm and reach a maximum age of 20 years.

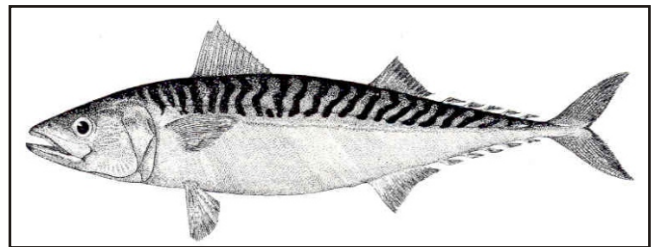


Figure 1. Atlantic Mackerel. Source: W.B. Scott and M.G. Scott, Atlantic Fishes of Canada, Canadian Bulletin of Fisheries and Aquatic Sciences No. 219.

The Atlantic mackerel is found in temperate waters on both sides of the North Atlantic Ocean. On the eastern shoreline, the Atlantic mackerel typically ranges from the west coast of Norway to Morocco, including the North Sea and the waters surrounding England. This species is also found in limited numbers off southern Iceland and the northern tip of Norway. In the western Atlantic, this species ranges from Triangle Harbour, Labrador, southward to Cape Hatteras, North Carolina. In Atlantic Canada, the Atlantic mackerel is most abundant around Newfoundland, in the Gulf and estuary of the St. Lawrence, off the coast of Nova Scotia and in the Bay of Fundy during summer and autumn.

Mackerel is a schooling fish, which undergo annual migrations in response to seasonal temperature changes. Two populations of mackerel have been identified in the northwest Atlantic, one residing in the Gulf of Maine, the other in the Gulf of St. Lawrence. The southern stock migrates during the spring towards the American coast between Cape Cod and Cape Hatteras. The northern population migrates during the summer months to the Gulf of St. Lawrence, particularly the Magdalen Shallows along the coast of Nova Scotia, and on the Grand Banks off Newfoundland. Mackerel typically overwinters on the continental shelf south of Georges Bank at depths of 70 to 200 m.

Mackerel is classified as a multiple spawner as the female spawn several times during spawning season. The southern stock spawns between March and April, while the northern stock typically

spawns between June and July. Mackerel is a fast maturing species, reaching sexual maturity at four years. Spawning takes place anytime during the day in open water at temperatures 9 to 13°C. The eggs and sperm are released into surface waters, remaining concentrated in the upper 10 m, and depend on water movements for contact and fertilization. An average size mature female (40 cm) will release approximately 400,000 eggs during the spawning period. The eggs are usually smooth, round, transparent and average 1.3 mm in diameter. The eggs will hatch within 5 to 7 days depending on water temperature.

The newly hatched larvae are roughly 3 mm in length but grow rapidly, reaching over 20 cm at the end of the first year. Mortality rates are extremely high, reaching upwards of 50% per day during both the egg and larval stages. Although not understood, the high mortality rates are assumed to be the result of predation by pelagic fish, larval cannibalism, and sudden temperature changes. Adult mackerel engage in both filter feeding (gill rakers filter small food particles from the water) and pursue other organisms such as amphipods, crab larvae, small squid, fish eggs, capelin, shrimp, and herring. The main predators of Atlantic mackerel are larger marine species, such as porbeagle, dogfish, Atlantic cod, bluefin tuna, swordfish, porpoise, and harbour seal.

Harvesting and Management

Atlantic mackerel has been harvested in the northwest Atlantic since the early 17th century. The first recorded landings for mackerel in the northwest Atlantic are dated in the 1950s and early 1960s. Foreign fishing of this species was reduced with the establishments of the Exclusive Economic Zone (EEZ) in 1977. Canadian landings have averaged approximately 20,000 metric tonnes (mt) per year from 1965 to 2001. Newfoundland landings vary according to seasonal water temperatures and resource availability, ranging from 4,250 mt in 1990 to over 8,000 mt in 2001, with an average value of \$1,146,000 (Fig. 2). Total value of Canadian landings averaged \$ 8,301,250 (Cdn.) between 1990 and 2001. In the northwest Atlantic, a variety of fixed and mobile gear types are employed to harvest mackerel. The most common gear types used in the Canadian fishery include gillnets, purse seines, traps, handlines, beach seines, jiggers, weirs, trawls, longlines, and Danish and Pair seines. Foreign vessels, which are typically larger than Canadian vessels, harvest mackerel almost exclusively with trawl gear, particularly, otter and midwater trawls.

Atlantic mackerel is harvested entirely within the Canadian and United States EEZ's therefore, management of these sub-areas resides with the corresponding governments. In Canada, all fisheries are regulated under the Department of Fisheries and Oceans (DFO). On April 3, 2002 a multi-year (2002-2006) mackerel management plan for Atlantic Canada and Quebec was announced by DFO. The total allowable catch (TAC) for 2002 was set at 75,000 mt with subsequent catch rates based on scientific advice and divided 60/40 between traditional inshore fisheries and the exploratory mobile gear fishery. The traditional size restriction of 25 cm (fish length) was retained but allows for possible increase following further research into population dynamics.

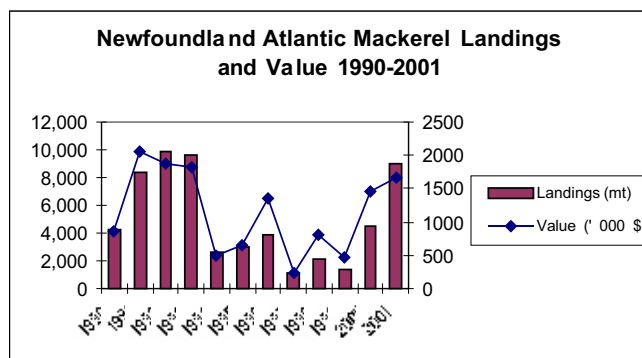


Figure 2. Newfoundland Atlantic Mackerel Landings and Value 1990 - 2001. Source: DFO Statistics, Canada

Processing and Marketing

Atlantic mackerel has very active digestive enzymes, high latent heat, and warm body temperatures, resulting in fast spoilage rates. Therefore, the catch requires immediate chilling to lower body temperature and slow rigor mortis and hence bacterial degradation. Two methods utilized to slow the rate of spoilage include refrigerated seawater systems (RSW) and chilled seawater systems (CSW). The catch remains chilled until point of landing and is then transported to a designated processing facility. In 2001, 20 processing companies were involved in mackerel production in Newfoundland and Labrador. Mackerel harvested in Canada was produced as dried, fresh, frozen, live, marinated, roe, salted, and smoked.

Japan holds the world's largest market for mackerel products. A portion of the total Canadian catch is exported to Asian countries as well as to the United States, Central and South America, Africa, and several Caribbean countries. Asian countries, particularly Japan, have strict market requirements based on a number of prerequisites for seafood products, including freshness, amount of damage to the raw material, fat content, size (600 g or greater), product arrangement, consistent package weights, proper labelling, and cold storage temperatures. The price for mackerel in Japan varies according to the season, product type and condition. In 2001, the price for frozen mackerel in Newfoundland and Labrador was \$1.10-1.32/kg at the plant gate, with a premium for fish over 800 g. The majority of mackerel catches in the province are smaller than the requested size, with only 11.5% greater than 650 g (6 years of age) in 1999. Therefore, most processors are unable to charge the premium price and mackerel has remained a low priced product for a number of years.

Processing and Marketing

Mackerel resources in the northwest Atlantic appear to be declining as evidenced by the decreasing stock biomass estimate for 2002 (366,022 mt). The stock biomass is significantly lower than previous years, and further proof is in the failure of domestic fishing effort to reach the establish TAC in recent years. The reduction in stock biomass is likely the result of a number of factors such as fishing effort and environmental changes. Future management will require further assessment of spawning stock populations, increasing size restrictions (>25 cm), and the capture of new markets, particularly in eastern Europe, the Far East, and western Africa.

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