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The Atlantic Halibut and Its Utilization

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INTRODUCTION

In the early days the English thought highly of halibut, serving it on holy days. Since butte was the middle English word for flatfish or flounder, "holy butte" eventually became halibut.

Prior to a period near the middle 1800's the cod was the main species sought by fishermen from the northwest Atlantic region. This was because preservation of fresh fish aboard boats was not yet practiced, and the cod could be preserved by salting with subsequent drying. (Those boats fishing for cod relatively close to shore made many day trips, the fish being held in the eviscerated state.) The fish were beheaded, split, and salted after landing in port. On boats which made fishing trips of several days, weeks, or months, the eviscerated fish were beheaded, split, salted, and held in kench (piles of salted fish) aboard the boat. In those days the Atlantic halibut, *Hippoglossus hippoglossus*, was considered to be a trash fish and a pest since it oftentimes ate the cod which had been caught by the hooks attached to fishing lines.

With the advent of ice for preserving fish aboard boats, fishermen began to fish for other species that were found to have good eating quality, including the halibut, since fish could then be brought to shore and sold for consumption in the fresh state. This was especially the case when it was learned that ice distributed among fish was a more efficient method of preservation than that of placing fish in one part of a hold pen and ice in another part of the same pen. Also, the fact that fish could be preserved for some time by adequate icing provided for the sale of fresh fish inland at some distance from the shore. Since the halibut, prepared for consumption from the fresh state, is one of the most delectable of species, it soon became popular and was subsequently sought in quantity in the waters off the northeast areas of the United States and off Canada.

PHYSICAL CHARACTERISTICS

The halibut (Fig. 1), largest of the flatfishes, is a kind of flounder. Like flounders, the halibut maintains a lateral position so that one of its sides is up and the other side is down. It has a large mouth which extends back to the eyes, with sharp, curved teeth. In proportion, it is about one-third as wide as it is long but, compared with other flounders, it is relatively thick. The tail of the halibut is wide and slightly curved (concave). There are two small similar ventral fins located just below the gill covers. The dorsal fin starts above the eye and extends to the caudal peduncle (narrow part near the tail). It has 98-105 rays and is broadened near the midpoint. The anal fin is similar to the dorsal fin but somewhat shorter, starting behind the pectoral fin and running to the caudal peduncle. It has 73-79 rays and is preceded by a sharp, spine-like projection of bone which, in young fish, projects exteriorly but in the old fish is hidden by the skin. The pectoral fins are not alike, with the one on the upper side being obliquely pointed, and the pectoral fin on the lower side being rounded.

Halibut which weighed up to 600-700 pounds (272-318 kg) have been caught off the U.S. east coast but such large fish are now rare. Of those caught now, the large females average 100-150 pounds (45-68 kg) in weight and the large males 50-200 pounds (23-91 kg). At the same age the female is larger than the male. A 24-inch (61-cm) long halibut (head and tail included) weighs about 5.5 pounds (2.5 kg), while a 74-inch (188-cm) halibut weighs about 215 pounds (98 kg). Commercial sizes of halibut are "chicken," weighing 5-10 pounds (2.25-4.5 kg), "medium," weighing 10-60 pounds (4.5-27 kg), "large," weighing 60-80 pounds (27-36 kg), and "whales," weighing 80 pounds (36 kg) and over.

RANGE

In the western Atlantic halibut are found from the Gulf of St. Lawrence and the Grand Banks off Newfoundland to Nantucket Shoals. They are rarely found as far south as in the waters off New York.

BREEDING HABITS

The east coast halibut spawn from April through September. The eggs are comparatively large, 3.1 to 3.8 mm in diameter, and large females may produce as many as 2,000,000 eggs. However, the average mature females produce a small number of eggs. Since this is the case, it has been found that in order to conserve the stock, halibut must be protected from fishing during certain parts of the spawning season, and the quantity of fish taken from the various areas must be limited to a yearly quota. This kind of action has been taken on the west coast where halibut is still fished commercially. The Atlantic stock was badly depleted before effective management measures could be

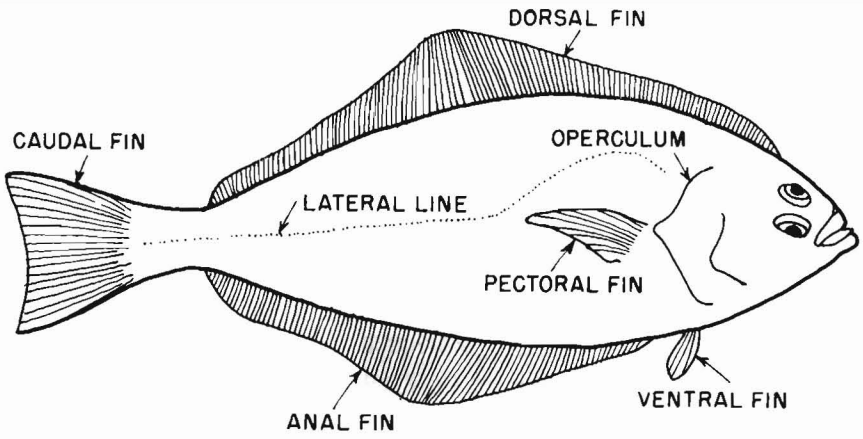


Figure 1.—The Atlantic halibut, *Hippoglossus hippoglossus* (Linnaeus).

applied, and because of the small size of the Atlantic halibut stock. Halibut is no longer a directed fishery in the Atlantic.

It is believed that the halibut spawn on the slopes of all offshore banks as well as on the continental slopes. The eggs are not buoyant but sink to the bottom where they are fertilized by the males. The period required for hatching of the fertilized egg is not known. The larvae are pelagic and stay close to the surface until they reach a size of 4-5 inches (10-13 cm) when they are about 1 year old. Small larvae, which are not pigmented, swim upright and have an eye on either side of the head. At a size of about 0.8 inch (2 cm) the left eye starts to migrate towards the right side of the head. At a size of 4 inches (10 cm) the left eye completes its migration to the right side of the head. The fish (about 1 year of age at this time) descend to the bottom area of the habitat. The right side of the fish, now the upper side, becomes pigmented, and, as it will as an adult, the young halibut lies on its left side on the ocean bottom. The color of the mature halibut is chocolate to olive or slaty brown on the upper (eyed) side. The lower side is white or white blotched with gray. The mature fish has small scales on the head and body, and it is covered with a slimy mucus. Halibut reach maturity at an age of 9-10 years.

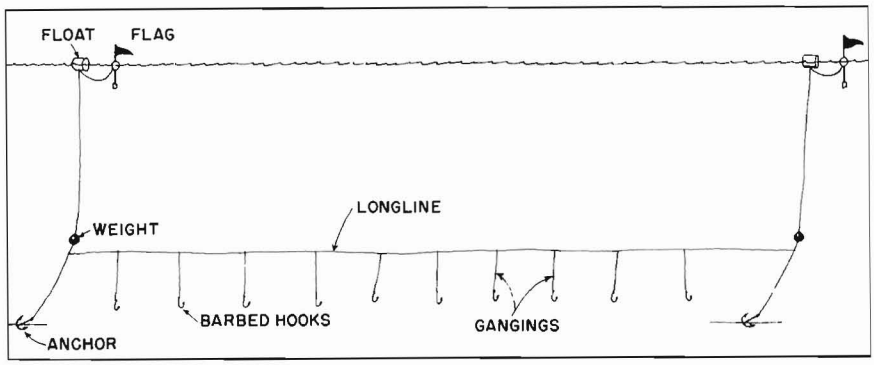
FEEDING HABITS

The food of the halibut consists mostly of other fish. Cod, cusk, haddock, ocean perch, sculpins, silver hake, herring, capelin, skates, flounder, mackerel, and others have been found in the stomachs of the east coast halibut. Clams, mussels, crabs, and lobsters are also eaten to some extent.

HARVESTING

Off the U.S. east coast we no longer have a directed halibut fishery. That is, vessels do not attempt to fish for halibut exclusively, and all of the halibut which is caught is only incidental to that of other species for which the fishing effort is directed. When vessels fished for halibut as the principal species, longlines were used. A longline (Fig. 2), which is still used for catching other species, consists of a comparatively large and long central line to which short smaller lines (gangings or snoods) are attached every few feet[1]. A large barbed hook is spliced to the end of each ganging. The hooks are baited (herring was used for halibut) and the line is let down with an anchor also attached to the line and to another with flag and float which remain on the surface. The baited line is allowed to rest on the bottom for some distance (in some instances long lines extend for several miles[2]). At the far end of the line another anchor, flag, and float are attached as at the beginning. The long line is allowed to remain on the bottom for some time after which the first anchor is pulled up and removed and the line is brought aboard the boat with the assistance of a revolving lock or gurdy. As the line is brought to the boat the fish are removed and, beyond the gurdy, the line is coiled into a tub and rebaited for another set. Where halibut fishing was carried out from dories, the lines were often underrun. That is, the anchor was pulled up and the line was placed over the bow of the dory. As the line was pulled in, the fish were removed, the hooks rebaited, and the anchor with line, float, etc. thrown back into the water to return to near the same area on the bottom where it was formerly resting. Halibut are still caught on longlines that are set for other species.

Figure 2.—The longline.



[1] 1 foot = 30.5 cm.
[2] 1 mile = 1.6 km.

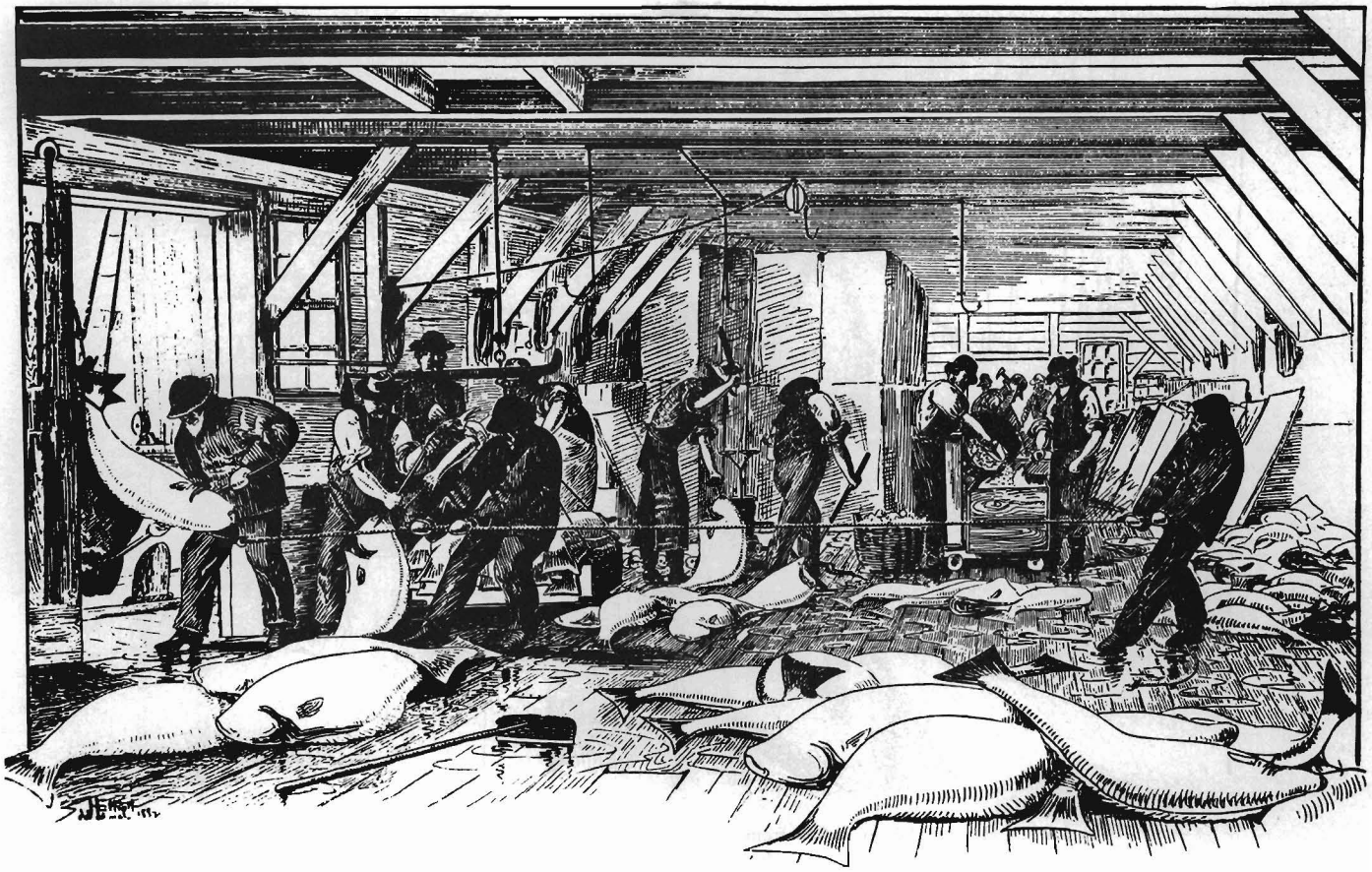


Figure 4.—Weighing, unheading, and packing fresh Atlantic halibut in ice for shipment by rail at Gloucester, Mass. Drawing by H. W. Elliott, 1882.

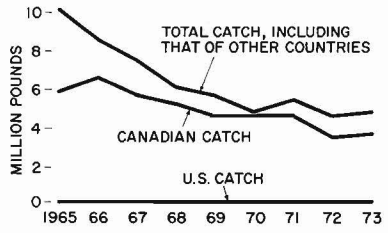


Figure 3.—Halibut catch from the northwestern Atlantic Ocean (1965-73).

It is reported that during the middle 1880's some 10,000,000 pounds (4,540,000 kg) of halibut were harvested from the northwest Atlantic Ocean. The port of Gloucester had about 40 vessels engaged in fishing exclusively for halibut, which was handled entirely as fresh fish. The vessels were among the best of the Gloucester fleet, averaging 75-80 tons (68-72.5 metric tons) and capable of relatively high speed for the time. The size of the crew was about 12. Halibut were gradually depleted from this area by overfishing and by taking fish during the spawning season. Eventually this species, which at one time was plentiful inshore, could only be caught in deep-water banks and it even became comparatively scarce in these areas. From the 1965-73 catch rates (Fig. 3) it can be seen that most of the catch was made by Canadian fishermen—about 4,000,000 pounds (about 1,800,000 kg) over the past few years. The U.S. catch is obviously relatively low at less than 250,000 pounds (about 100,000 kg) annually, and it has been rather constant throughout that period. As many as 14 countries fish for halibut; therefore, it is clear that the combined catch by countries other than Canada and the United States dropped remarkably from 1965 to 1970 when, it appears, only Canada and the United States landed any sizeable quantities. It can be seen from the graph that the total halibut catch decreased throughout the 1965-73 period, except for slight upward fluctuations in 1971 and 1973, and that the catch rate at the end of the period was reduced to approximately half that of 1965. The U.S. east coast landings in earlier times were as follows: In 1886, over 9,000,000 pounds (4,100,000 kg), in 1928, 4,257,000 pounds (1,933,000 kg), and in 1929 the same area provided less than 2,000,000

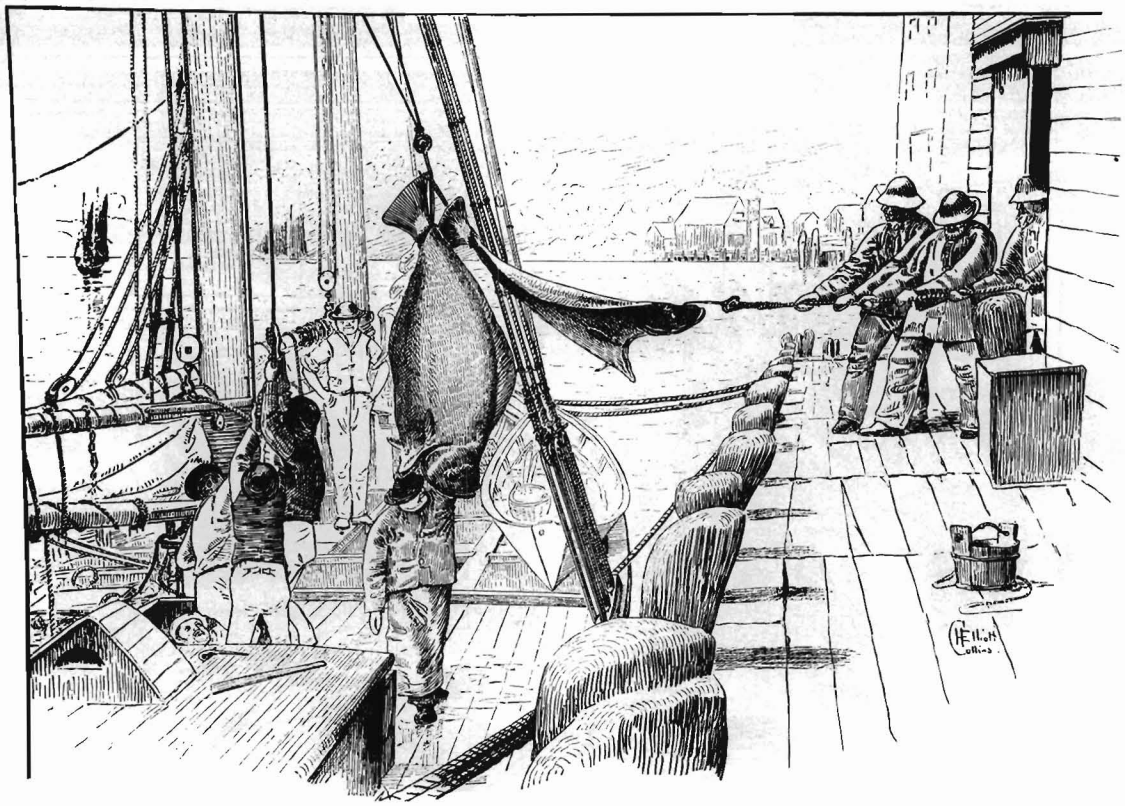


Figure 5.—Hoisting Atlantic halibut from the hold of a schooner at Gloucester, Mass. Drawing by H. W. Elliott and Capt. J. W. Collins.

pounds (900,000 kg). Since then, the catch has dwindled to about 250,000 pounds (113,500 kg).

HANDLING ABOARD BOATS

On the east coast all of the halibut caught is handled in the fresh state. When brought aboard fishing boats the throat of the halibut is cut, the belly is split, and the gills and entrails are removed by hand. The surface and belly cavity of the fish are then washed with seawater. The belly cavity (sometimes called the poke) may be filled with ice and the fish are placed in hold pens in layers that are alternated with layers of ice. Boats may remain at sea for as long as 7-10 days before returning to port, but the halibut keeps well under suitable icing and these fish are generally landed in port in good condition. At times there have been some cases of surface yellowing of the white side of the fish. This is due to the growth of a fresh water bacteria, *Pseudomonas flourescens,* and on the west coast this problem was solved by chlorinating the water used to make the ice which is used aboard the fishing boats.

HALIBUT UTILIZATION

Halibut are used mainly as food, although they are also used in the manufacture of other products of commerce. When landed in port, the fish are removed from the hold of the boat in a heavily roped wide mesh net which is hoisted to the dock. The fish are then beheaded, washed, and placed in boxes in layers that are alternated with layers of ice. In this condition they are shipped to the retailer or to some commission agent who will reship to the retailer.

On the U.S. east coast, halibut are so scarce that the relatively small landings are only from the incidental catch. All of this catch is handled in the fresh state with a portion of it going to members of the fishing crew, their families, and friends, and the remainder going to restaurants and to processors who supply the restaurants. Halibut are generally consumed as steaks, mainly because of their relatively large size. The steaks are made by cutting the body of the fish into transverse slices of about 0.75-inch (about 2-cm) thickness. When halibut meat is at its highest quality, it is among the best tasting of meats, and it is worth the high price that it commands—a price which is as high as that of high-priced beefsteak. In fact it has a somewhat meaty, though unique taste, and it is very tender without being mushy. Unfortunately, fresh halibut (i.e., halibut that has never been frozen) is only rarely available, and most of the halibut consumed has been caught off the west coast of the United States or in

other remote areas and arrives on the U.S. east coast in the frozen state. The fat in halibut, as in some other fish, is relatively high in the polyunsaturated fraction, and it is therefore readily oxidized, giving rise to rancid off-flavors and off-odors. Without proper handling and care, frozen halibut steaks can become rancid to some degree. In addition, the meat may become tough, and in some cases it may even become dehydrated which accelerates rancidity and further depreciates the quality of the texture. Thus, while halibut is an excellent food fish, an experience with improperly handled halibut may cause some consumers to believe otherwise.

In medium-sized or large halibut, portions of flesh from either side of the head weighing 0.5 pound or more, and accurately called halibut cheeks, are considered by many to be the most delectable parts of the fish. These are cut out by inserting a pointed knife below the eye and circling the cheek cavity while leaving a narrow strip of intact skin. The flesh is then cut through to the intact skin and the flesh is pulled away from the skin with which it is covered. Generally, halibut cheeks are sold as the fresh product although small quantities may be frozen.

The Atlantic halibut, which with suitable fishing regulations might have continued to provide a significant amount of animal protein to the consuming public, has become of little importance as a food for humans due to extreme fishing pressures over an extended period of time.

HALIBUT BY-PRODUCTS

Halibut heads, with or without the cheeks, are utilized for the manufacture of fish meal, a cooked dehydrated product which is used to supplement feed for cattle, hogs, and chickens.

Halibut livers are rich in vitamin A and (once) brought a good price since the oil could be extracted and used for medicinal purposes. When synthetic vitamin A was developed, halibut livers became less important, although there is still some utilization of halibut livers. The livers are taken when the fish are eviscerated aboard the fishing boat and held under refrigeration. In port, the livers are heated and pressed to obtain an oil-water-protein mixture which is allowed to settle or which is centrifuged to obtain the clarified oil. The oil content is in the range of 5-19 percent.

Halibut skins have been used to produce fine leathers by the chrome tanning process which produces softer more pliable leathers than can be produced by the vegetable tanning process. Halibut leathers are easily dyed in a variety of colors and have an attractive surface design resulting from the removal of the scales from their follicles.

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