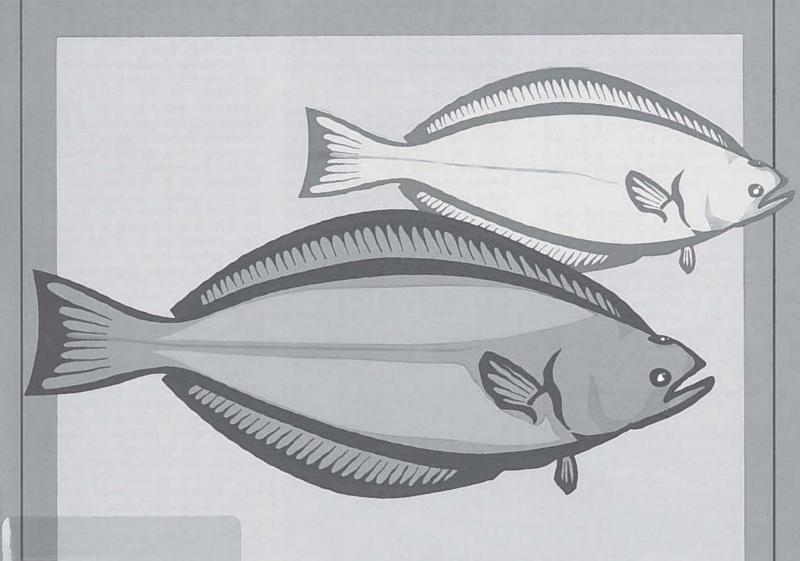
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# Underwater World

**Turbot (Greenland Halibut)** 



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Underwater World

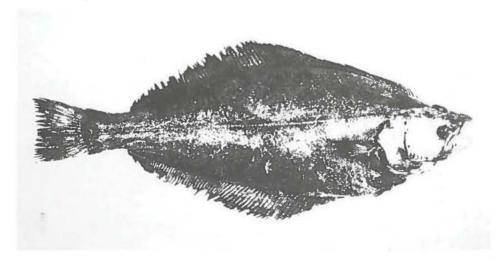
### Turbot (Greenland Halibut)

The Greenland halibut is a deepwater flatfish which is known to many people under many names. To Americans it's the Greenland halibut, to eastern Canadians the "Greenland turbot" or "Newfoundland turbot", to English fishermen the "blue halibut", to Danes the "hellefisk, to Greenlanders the "kaleralik", and to German fishermen, the "black halibut".

This marine fish is similar to the common or Atlantic halibut, except that it is much smaller (reaching a maximum size of 120 centimetres and a weight of 25 kilograms). The upper side is also darker in colour. Hence, its other names: the black or blue halibut, and the lesser or mock halibut.

In the past, Canadian fishermen were forced to compete with many foreign fleets seeking the Greenland halibut in the northwestern Atlantic. Since the 1977 establishment of the 200-mile fishing zone, however, the foreign effort has been phased out in many areas, and the Canadian harvest of this lucrative species has vastly improved.

Dorsal view of an adult Greenland halibut.



#### Distribution

Greenland halibut thrive in the cold. northern waters of the Pacific and Atlantic oceans, and is most plentiful wherever there are rich stocks of sea prawn. In the northwestern Atlantic, they are especially abundant in the deep coastal bays or fjords of West Greenland, off the continental shelf of Baffin Island and in the Ungava Bay area of Hudson Strait. They are also found at greater depths along the continental slope of Labrador, and in the deepwater bays of northeastern Newfoundland. Upon approaching maturity there appears to be a general migration to Davis Strait.

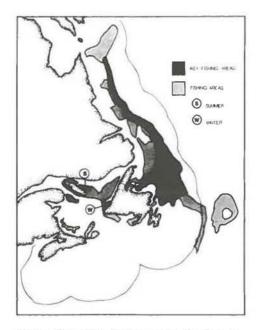
Though the abundance of these fish diminishes south of the northern slopes of Newfoundland's Grand Banks, Greenland halibut have also become relatively plentiful in the Gulf of St. Lawrence in the last few years. A prespawning winter concentration occurs in the Laurentian Channel to the southwest of St. Georges Bay, and summer feeding concentrations are found at the mouth of the St. Lawrence River to the north of Anticosti. The southeastern tip of the Scotian Shelf appears to mark the southern edge of this species' distribution.

#### Description

The Reinhardtius hippoglossoides belongs to an order of flat, bilaterally symetrical fish, the Pleuronectiformes, comprising some seven families and 117 species. The members of this order undergo an amazing transformation during the larval stage. They begin life swimming with the dorsal fin upwards, like any salmon or trout. Gradually, however, one eye migrates across the top of the larva's skull to position itself close to the eye on the other side of the head. There are corresponding modifications to the skull bones, nerves and muscles. The eyeless side, for example, becomes flat while the other side grows slightly rounded. Then, the developing fish turns over and swims on its flat, eyeless side.

A few features distinguish the Greenland halibut from other flatfish. Normally, the eyes of flatfish are located on the top, coloured side of the

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Major Canadian fishing areas for Greenland halibut.



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body, and the blind side is white. Most such fish in the north Atlantic are rightsided. That means that individuals of the species lie on the left side as the eye migrates from the left to the right during larval development. In the Greenland halibut, however, the left eye has not completely migrated to the right side, but is located on the upper edge of the forehead. Moreover, the blind side is not white, but dark grey, while the other side is nearly black. Furthermore, the fish is not perfectly symmetrical so that some members of the species, those smaller fish that tend to swim in the middle levels of the ocean rather than along the seabed, have been known to swim with the dorsal fin upwards.

These special characteristics make the Greenland halibut unusually mobile, and the position of the left eye allows it a greater field of vision than is possessed by most flatfish.

### Reproduction

Fish from the Greenland, Labrador and Newfoundland areas migrate annually to the deep waters of Davis Strait to reproduce. Spawning takes place in the early spring at depths of 650 to 1,000 metres, depending on the particular area. To the south of the deep ridge which runs between Baffin Island and Greenland, fish spawn in water temperatures between 3° and 4°C and tend to remain at around 650 metres. To the north, spawning occurs in much deeper water with temperatures of 0°C or less.

The eggs, as many as 160,000 from a single fish, drift in the middle depths for some weeks, later rising in the form of larvae into the surface waters where they are carried by currents along the west coast of Greenland and into the northern part of Davis Strait. There, the current turns southward, and some larvae are taken as far as the continental banks off Baffin Island. The vast, shallow areas to the northwest, west and southwest of Disko Bay are important nursery grounds where larvae develop at the depths down to 250 metres. From here, the young fish drift with the current southward to the continental shelf and slopes of Labrador and Newfoundland.

In the Gulf of St. Lawrence, mature Greenland halibut concentrate and spawn in winter in the Laurentian Channel off the southwest tip of Newfoundland. The young fish then move to nurseries on the north side of Anticosti Island where small shellfish provide plentiful food.

#### Food

The Greenland halibut is a voracious feeder. Whole, yet only slightly smaller fish of species which share the same niche in the ocean have been found in the stomachs of halibut.

Small fish (less than 20 centimetres in length) feed on plankton and shrimplike crustaceans, while larger fish (up to 80 centimetres) in the southern Labrador and Newfoundland areas, eat mainly capelin. Those that swim in the deep channels of northern Labrador and West Greenland live mainly on shrimp. Very large halibut feed heavily on larger fish such as squid, cod, redfish and even other Greenland halibut.

#### Habits

Although Greenland halibut can be found in small numbers at depths of less than 100 metres, most of them are caught near the sea bottom at depths of between 200 to 600 metres. In the southern part of the range, however, they go as deep as 1,500 metres.

Optimum water temperature for the species ranges from 1° to 3°C. Ordinarily, Greenland halibut can tolerate a wide range of temperatures, but this is less true during the reproductive phase. Except during spawning, they are able to range from ocean surface to seabed. Smaller fish (less than 20 centimetres) are frequently taken as a by-catch by the shrimp trawlers working bottom depths of 200 to 400 m or in the salmon drift nets near the surface. Larger fish tend to be taken from deeper areas by longliners and deepsea trawlers in depths of over 1,000 m.

#### Growth

The numbers of male and female Greenland halibut are roughly equal, as is their growth rate, until they reach a length of about 45 centimetres at the Underwater World



Scientists onboard a research vessel extracting otoliths (earbones) from a Greenland halibut for ageing purposes.

age of six to seven years. After that, the abundance of males decreases, and those remaining grow much more slowly than the females. Fish larger than 90 centimetres are all female. The reason is that much of the energy previously used for body growth by the early maturing males is subsequently diverted to the formation of products needed for egg fertilization. Females also tend to live longer, with specimens as old as 20 years being recorded, while males seldom live longer than 12 years.

#### Predators

Casualty rates are high among Greenland halibut. The most significant predator of adults is the Greenland shark, found in great numbers in the same waters and at the same depths as halibut. Fishermen frequently find, on retrieving hooked lines, that their catch has been multilated by the sharks, particularly in the area of west Greenland.

Other important predators of adult fish are seals and two species of Arctic whales — the white whale and the narwhal. As early as 1852, scientists working in the Greenland area noted that

the periodic disappearance of the fish usually coincided with increased sightings of white whales. Periodic invasions by whales into the fjords is now known to be usually followed by a collapse of the halibut fishery.

The larvae of Greenland halibut are eaten by cod and salmon, whereas the young, bottom-dwelling fish and medium-sized adolescents are eaten by cod and by larger Greenland halibut.

#### The fishery

For management purposes, Greenland halibut are treated as three stocks in the Northwest Atlantic.

#### Baffin Island/West Greenland

The most northerly management unit of Greenland halibut constituted an important harvest for Greenlanders from the mid-1800s right up to the 1920s, when milder climatic conditions resulted in a large influx of cod into these waters. By 1935, the fishery had completely failed because of the pressures of numerous cod as predators as well as competitors. Almost 20 years passed before the harvest again improved enough to warrant increased exploitation in Greenland, and more energetic marketing in Europe and the United States.

During the past decade, landings have fluctuated widely, with over 25,000 metric tons (t) taken in 1975, for example, while 1979 catches totalled only 12,000 t.

The Soviet Union and Denmark were the main exploiters of the fishery. Soviet fishermen harvested the halibut from large offshore bottom trawlers, while the Danes prefer longlines and gillnets. In more recent years, the Greenlanders have been mainly involved in this fishery.

#### Labrador/East Newfoundland Stock

The sale of Greenland halibut from this stock dates back as far as 1857. Until 1964, Newfoundlanders played an important part (along with Greenland Danes) in a traditional baited-line fishery. The products, mainly in salted form, were exported to eastern Canadian markets, as well as to the United States and British West Indies.

Typical mixed catch of Greenland halibut, redfish and witch flounder on a Polish trawler.



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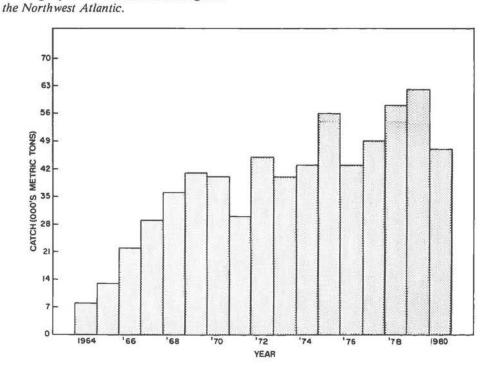
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Reward poster distributed to fishermen for the return of tags recovered from Greenland halibut. However, with the introduction of highly efficient synthetic gillnets in the mid-1960s, the use of longlines decreased, and by 1967 had been practically eliminated from the Greenland halibut fisheries. Also in the late 1960s, Polish and Soviet fleets began to compete for the harvest in the deep waters of the continental slope off northern Labrador. Newfoundland landings dropped sharply as a result. From 1970 to 1977, landing stabilized at around 30,000 t annually.

However, with the introduction of the 200-mile limit in 1977, the foreign effort began to be phased out. By 1980, the fishery for Greenland halibut in this area belonged once again to Newfoundland fishermen.

The Newfoundland gillnet fishery has proved very lucrative over the past few years, and the 1980 gillnet landings reached three times the 1967 level of 9,000 t.

Landings of Greenland halibut throughout



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#### The Gulf of St. Lawrence

The fishery for Greenland halibut is rather new to the Gulf of St. Lawrence with landings up to 1976 varying from 600 to 1,000 t each year. In 1977 and 1978, landings increased to 4,000 t, and the next year, it more than doubled to almost 10,000 t. The 1980 catches however, declined to just over 7,000 t.

Until 1979, most of the landings represented by-catches taken during summertime on the north side of Anticosti Island by Quebec fishermen fishing for shrimp. Some of the harvest was also taken by Newfoundland trawlers to the southwest of St. Georges Bay in the Laurentian Channel where the Greenland halibut form a pre-spawning concentration during the winter.

Since 1979, however, the fishery has been carried out almost exclusively by the Quebec gillnet fishermen fishing for Greenland halibut on the southwest side of Anticosti Island, and near the mouth of the St. Lawrence River.

Quota Regulation

The Baffin Island/West Greenland unit and the Labrador/East Newfoundland unit have been under catch quota regulation since 1974 with the Total Allowable Catch (TAC) being based on the scientific advice of the International Commission for Northwest Atlantic Fisheries and of the Northwest Atlantic Fisheries Organization. The TAC for 1981 by all countries was 25,000 t for the Baffin Island/West Greenland stock, and 55,000 t for the Labrador/East Newfoundland stock.

The Gulf of St. Lawrence stock had never been under catch quota regulation. However, scientific advice from the Canadian Atlantic Scientific Advisory Committee recommended a 1982 catch limitation of 7,500 t which was subsequently imposed.

Further Reading:

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#### Text:

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