ATLANTIC HALIBUT

Hippoglossus hippoglossus

Sometimes known as Hirame

SUMMARY

Atlantic Halibut can live for 50 years, grow to over eight feet in length, and weigh over 660 pounds. They are found on both sides of the North Atlantic Ocean as well as some parts of the Arctic Ocean. Atlantic Halibut were once extremely abundant along the northeast U.S. and Canadian coastlines, but populations have crashed due to centuries of overfishing. Since the 1960's, abundance has been historically low and Atlantic Halibut have been virtually eliminated from many areas where they once occurred. In Canada, Atlantic Halibut are taken in bottom longlines with most of these fish sold in the U.S. There is currently no directed fishery in the U.S. and all landings occur as bycatch in groundfish fisheries. Management plans have been largely ineffective as most populations remain considerably depleted. Instead of Atlantic Halibut, try Pacific Halibut. Chef Barton Seaver says, “This is a no brainer: eat Pacific Halibut. The fish come from sustainably-managed populations ranging all along the west coast of the US and Canada. It is nearly the same eating experience and is oftentimes less expensive and easier to find than its Atlantic brethren.”

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**Color**
LIFE HISTORY

Core Points (only one selection allowed)

If a value for intrinsic rate of increase ('r') is known, assign the score below based on this value. If no r-value is available, assign the score below for the correct age at 50% maturity for females if specified, or for the correct value of growth rate ('k'). If no estimates of r, age at 50% maturity, or k are available, assign the score below based on maximum age.

1.00  Intrinsic rate of increase <0.05; OR age at 50% maturity >10 years; OR growth rate <0.15; OR maximum age >30 years.

2.00  Intrinsic rate of increase = 0.05-0.15; OR age at 50% maturity = 5-10 years; OR a growth rate = 0.16–0.30; OR maximum age = 11-30 years.

Intrinsic rate of increase was estimated to be 0.146, although this is based on limited data (Col and Legault 2009). Age at sexual maturity was estimated at 11 to 12 years for females and 7 to 8 years for males in Canadian waters (DFO 2010). However, recent data indicate that Atlantic Halibut may grow faster in U.S. waters, with median age at maturity reported to be 6.0 years for males and 7.3 years for females (Sigourney et al. 2006). Maximum age is over 50 years (Muus and Dahlström 1974). Mature Atlantic Halibut can grow over 2.5 m in length and weigh over 300 kg (Robins and Ray 1986), but most adult fish are between 20 and 40 kg (NOAA 2006).

3.00  Intrinsic rate of increase >0.16; OR age at 50% maturity = 1-5 years; OR growth rate >0.30; OR maximum age <11 years.

Points of Adjustment (multiple selections allowed)

-0.25  Species has special behaviors that make it especially vulnerable to fishing pressure (e.g., spawning aggregations; site fidelity; segregation by sex; migratory bottlenecks; unusual attraction to gear; etc.).

Atlantic Halibut spawn once per year in synchronous groups from late winter through early spring (Neilson et al. 1993) at depths of 200 m or more (Scott and Scott 1988). There have been no reports of Atlantic halibut spawning in U.S. waters (Gulf of Maine-Georges Bank region) in recent years (Collette and Klein-McPhee 2002; NOAA 2006).

-0.25  Species has a strategy for sexual development that makes it especially vulnerable to fishing pressure (e.g., age at 50% maturity >20 years; sequential hermaphrodites; extremely low fecundity).
Species has a small or restricted range (e.g., endemism; numerous evolutionarily significant units; restricted to one coastline; e.g., American lobster; striped bass; endemic reef fishes).

Atlantic Halibut are found on both sides of the North Atlantic and in some parts of the Arctic Ocean (NOAA 1999). Atlantic Halibut also occur along the Norwegian coast, in the Faroe Islands region, around Iceland, southern Greenland, and as far south as the Irish Sea and Bay of Biscay (Collette and Klein-McPhee 2002). On the east coast of North America, Atlantic Halibut occur from the coast of Virginia in the south to the waters off Disko Bay, Greenland in the north (DFO 2009a). We consider their range to be medium sized, however points were removed because they have been virtually eliminated from many areas due to overfishing (Kristinsson and Myers 2002; Grasso 2008).

Species exhibits high natural population variability driven by broad-scale environmental change (e.g. El Nino; decadal oscillations).

Species does not have special behaviors that increase ease or population consequences of capture OR has special behaviors that make it less vulnerable to fishing pressure (e.g., species is widely dispersed during spawning).

Species has a strategy for sexual development that makes it especially resilient to fishing pressure (e.g., age at 50% maturity <1 year; extremely high fecundity).

Large female Atlantic Halibut have high fecundity, producing several million eggs (GMRI 2002). However, there are probably very few large females left, so no points were added.

Species is distributed over a very wide range (e.g., throughout an entire hemisphere or ocean basin; e.g., swordfish; tuna; Patagonian toothfish).

Species does not exhibit high natural population variability driven by broad-scale environmental change (e.g., El Nino; decadal oscillations).

1.50 Points for Life History
ABUNDANCE

Core Points (only one selection allowed)

Compared to natural or un-fished level, the species population is:

1.00 Low: Abundance or biomass is <75% of BMSY or similar proxy (e.g., spawning potential ratio).

Atlantic Halibut were heavily overfished in the 19th and early 20th century (Grasso 2008). Although there is no longer a directed commercial fishery in the U.S., populations have failed to recover (NOAA 2006; Col and Legault 2009). Abundance of Atlantic Halibut is low throughout its range. In Canadian waters, populations are stable at very low densities compared to those in the early 20th century (Zwanenburg et al. 2003; DFO 2010). Since the 1960s, numbers have been well below the overfished threshold in U.S. waters (NOAA 2006). Surveys usually capture little to no Atlantic Halibut, indicating that abundance is so low that it is close to being below the detectable levels of the surveys (Col and Legault 2009).

2.00 Medium: Abundance or biomass is 75-125% of BMSY or similar proxy; OR population is approaching or recovering from an overfished condition; OR adequate information on abundance or biomass is not available.

3.00 High: Abundance or biomass is >125% of BMSY or similar proxy.

Points of Adjustment (multiple selections allowed)

-0.25 The population is declining over a generational time scale (as indicated by biomass estimates or standardized CPUE).

Atlantic Halibut in Canadian waters suffered intense fishing pressure in the first half of the 20th century (Grasso 2008). Since then, populations have failed to recover and the species remains at very low abundance (Zwanenburg et al. 2003; DFO 2010; Col and Legault 2009), although some stocks may be showing small population increases (Zwanenburg et al. 2003; DFO 2010). In U.S. waters, Atlantic Halibut have shown little sign of recovery and biologists do not expect the population to recover in the near future (Col and Legault 2009). Little or no recovery has been seen in Greenland, Iceland, and Norway (EC 2003). There are currently no indications that Atlantic halibut are either reproducing or growing at their maximum potential in their currently depleted state (Col and Legault 2009).
Age, size or sex distribution is skewed relative to the natural condition (e.g., truncated size/age structure or anomalous sex distribution).

Data from Norway indicate that in 1957 male Atlantic Halibut matured at age 9 to 15 years, but during the 1980s maturity was reached at age 5 to 10 years (Godo and Haug 1999), which may be a result of intense overfishing. Therefore, we removed points.

Species is listed as "overfished" OR species is listed as "depleted", "endangered", or "threatened" by recognized national or international bodies.

Atlantic Halibut face a high risk of extinction in the wild in the near future. The IUCN classifies Atlantic Halibut as Endangered on the IUCN Red List (IUCN 2010).

Current levels of abundance are likely to jeopardize the availability of food for other species or cause substantial change in the structure of the associated food web.

Grasso (2008) provides a comprehensive summary of the historical fishery, and explains that prior to 1836, Atlantic Halibut were incredibly abundant and were largely discarded due to the meat being poor for salting. In fact, before being depleted, Atlantic Halibut were so abundant that vessels could catch over 50,000 lbs (23 mt) in just two days (Goode 1884). Atlantic Halibut are important predators of fish and invertebrates, but also provide food for species such as seals and Greenland sharks (Bigelow and Shroeder 1953). Given that Atlantic Halibut were once extremely abundant, their depletion could have, or may have already had, considerable impacts on marine food chains and ecosystem function (Frank et al. 2005).

The population is increasing over a generational time scale (as indicated by biomass estimates or standardized CPUE).

Age, size or sex distribution is functionally normal.

Species is close to virgin biomass.

Current levels of abundance provide adequate food for other predators or are not known to affect the structure of the associated food web.

0.00 Points for Abundance
HABITAT QUALITY AND FISHING GEAR IMPACTS

Core Points (only one selection allowed)

Select the option that most accurately describes the effect of the fishing method upon the habitat that it affects

1.00 The fishing method causes great damage to physical and biogenic habitats (e.g., cyanide; blasting; bottom trawling; dredging).

2.00 The fishing method does moderate damage to physical and biogenic habitats (e.g., bottom gillnets; traps and pots; bottom longlines).

In Canada, Atlantic Halibut are taken with bottom longlines (DFO 2010) and caught as bycatch in the turbot gillnet fishery (DFO 2009b). In the U.S., there is currently no directed commercial fishery within federal waters and all landings from the northwest Atlantic region occur as bycatch in U.S. or Canadian groundfish fisheries (NOAA 2006).

3.00 The fishing method does little damage to physical or biogenic habitats (e.g., hand picking; hand raking; hook and line; pelagic long lines; mid-water trawl or gillnet; purse seines).

Points of Adjustment (multiple selections allowed)

-0.25 Habitat for this species is so compromised from non-fishery impacts that the ability of the habitat to support this species is substantially reduced (e.g., dams; pollution; coastal development).

-0.25 Critical habitat areas (e.g., spawning areas) for this species are not protected by management using time/area closures, marine reserves, etc.

Tagging data indicate that mature Atlantic Halibut return to the same spawning site over repeated spawning seasons (Jakupsstovu and Haug 1988). Spawning is believed to occur in waters of the upper continental slope at depths of 200 m or greater (Scott and Scott 1988) and coastal areas with depths of 20 – 60 m often serve as nursery areas for juveniles before they undertake migrations to distant areas (Jakupsstovu and Haug 1988, Neilson et al. 1993). In the U.S. and Canada, no time/area closures or marine reserves exist for Atlantic Halibut, thus points were subtracted.

-0.25 No efforts are being made to minimize damage from existing gear types OR new or modified gear is increasing habitat damage (e.g., fitting trawls with roller rigs or rockhopping gear; more robust gear for deep-sea fisheries).

-0.25 If gear impacts are substantial, resilience of affected habitats is very slow (e.g., deep water corals; rocky bottoms).
Habitat for this species remains robust and viable and is capable of supporting this species.

There is no published information describing the quality of existing habitat for Atlantic Halibut. Consequently, no points were added.

Critical habitat areas (e.g., spawning areas) for this species are protected by management using time/area closures, marine reserves, etc.

Gear innovations are being implemented over a majority of the fishing area to minimize damage from gear types OR no innovations necessary because gear effects are minimal.

If gear impacts are substantial, resilience of affected habitats is fast (e.g., mud or sandy bottoms) OR gear effects are minimal.

1.75 Points for Habitat Quality and Fishing Gear Impacts

MANAGEMENT

Core Points (only one selection allowed)

Select the option that most accurately describes the current management of the fisheries of this species.

1.00 Regulations are ineffective (e.g., illegal fishing or overfishing is occurring) OR the fishery is unregulated (i.e., no control rules are in effect).

In Canada, management is divided between two units: the Gulf of St. Lawrence and the Scotian shelf and Southern Grand Banks. In 1999, the Canadian Department of Fisheries and Oceans (DFO) increased the Total Allowable Catch (TAC) for the Scotian Shelf and Southern Grand Banks population from 850 metric tons (mt) to 1150 mt (Zwanenburg et al. 2003). Catch limits are not well enforced, but total landings have been below the TAC limit since 2004 (DFO 2010). In the Gulf of St. Lawrence, the TAC has been exceeded recently but mostly because of the increasing number of Atlantic Halibut under legal size being discarded (DFO 2009b). The minimum size limit does not sufficiently protect spawning females and most commercial catches include fish smaller than the size at which 50% of females reach maturity (DFO 2004).

In the U.S., management measures currently include a moratorium on directed harvests in federal waters, a bycatch limit of one legal-sized fish per trip, and a minimum fish size of 91 cm (36 inches) (NOAA 2006). The Gulf of Maine and Georges Bank population is
managed by the New England Fishery Management Council (NEFMC). Although this population is severely depleted, the NEFMC has not developed a recovery plan (NEFMC 2003). Additionally, since the 1999 regulations that prohibited landing Halibut less than 91 cm, there is evidence from Northeast Fisheries Observer Program data that smaller Atlantic Halibut are continuing to be landed (Col and Legault 2009). Kept Atlantic Halibut from observer data indicate that even after the 91 cm minimum size requirement, mean lengths of Halibut generally ranged from 80-90 cm (~ages 5.5-6.5), with minimum sizes of kept Halibut generally ranging from 40-50 cm (~ages 2.5-3.5). Mean lengths of discarded halibut have ranged from 27-70 cm (~ages 2-5), with minimum discard lengths generally ranging from 20-40 cm (~ages 1-3) (Col and Legault 2009). Regulation of the minimum size is a concern since it appears that even with current regulations, undersized animals are being taken. In order to ensure that the fishery minimizes the take of immature Atlantic Halibut, size limits would not only need to be increased to 103 cm, but compliance with the minimum size limit would need to be increased. Based on the 2008 U.S. assessment, Atlantic Halibut in the Gulf of Maine and Georges Bank region continues to be in an overfished condition (Col and Legault 2009).

2.00 Management measures are in place over a major portion over the species’ range but implementation has not met conservation goals OR management measures are in place but have not been in place long enough to determine if they are likely to achieve conservation and sustainability goals.

3.00 Substantial management measures are in place over a large portion of the species range and have demonstrated success in achieving conservation and sustainability goals.

Points of Adjustment (multiple selections allowed)

-0.25 There is inadequate scientific monitoring of stock status, catch or fishing effort.

Although catches are monitored and stock assessments are performed in Canadian and U.S. waters, biological research of Atlantic Halibut is lacking. The Department of Fisheries and Oceans in Canada monitors Atlantic Halibut with research vessel and longline surveys (DFO 2009b, DFO 2010). High variability in abundance estimates from groundfish surveys and no reports of spawning in the Gulf of Maine-Georges Bank region in recent years is concerning (DFO 2004). Recent data from Atlantic Halibut longline tagging studies (Kanwit 2007) has indicated extensive movements of immature animals, suggesting that, in the future, Atlantic Halibut should be assessed as a transboundary US/Canadian stock and further work should be conducted to clarify stock boundaries (Col and Legault 2009).

-0.25 Management does not explicitly address fishery effects on habitat, food webs, and ecosystems.

Before stocks were severely depleted, Atlantic Halibut were exceedingly abundant and vessels could apparently catch over 50,000 lbs in just two days (Goode 1884). However,
management plans have failed to address the impacts of their depletion on marine food chains and ecosystem function.

-0.25 This species is overfished and no recovery plan or an ineffective recovery plan is in place.

In Canada, Atlantic Halibut populations are severely depleted (Zwanenburg et al. 2003; DFO 2004, DFO 2010), but the species is not designated as overfished and no recovery plan has been implemented. Atlantic Halibut are classified as overfished in the U.S. (NOAA 2006; Col and Legault 2009). Recovery plans have been largely ineffective. There are currently no indications that Atlantic halibut are either reproducing or growing at their maximum potential in the currently depleted state (Col and Legault 2008). Several studies have shown that females mature at older ages and at larger sizes than males (Sigourney et al. 2006), yet minimum size limits in Canada do not sufficiently protect spawning females and the majority of commercial catches include fish smaller than the age at which 50% of females reach maturity (DFO 2004). While an increase in the minimum size limit might reduce the take of juveniles and increase their survival to spawning size, greater compliance is needed if these benefits are to be recognized (Col and Legault 2009). In addition, the Gulf of Maine-Georges Bank region is considered to be a separate stock from Canadian Scotian Shelf-Southern Grand Banks and Gulf of St. Lawrence stocks. However, in 2007, Kanwit showed that substantial transboundary movements occurred in Atlantic Halibut tagged off of the coast of Maine, with several individuals traveling over 1,000 km north-east to Newfoundland, the Gulf of St. Lawrence, and the Grand Banks, and others staying close to their release location, indicating that there may be both residential and migratory populations (Kanwit 2007). These new data suggest that future assessments should consider combining the Gulf of Maine-Georges Bank region stock with the Canadian stock (Col and Legault 2009).

-0.25 Management has failed to reduce excess capacity in this fishery or implements subsidies that result in excess capacity in this fishery.

+0.25 There is adequate scientific monitoring, analysis and interpretation of stock status, catch and fishing effort.

+0.25 Management explicitly and effectively addresses fishery effects on habitat, food webs, and ecosystems.

+0.25 This species is overfished and there is a recovery plan (including benchmarks, timetables and methods to evaluate success) in place that is showing signs of success OR recovery plan is not needed.

+0.25 Management has taken action to control excess capacity or reduce subsidies that result in excess capacity OR no measures are necessary because fishery is not overcapitalized.

0.25 Points for Management
BYCATCH

Core Points (only one selection allowed)

Select the option that most accurately describes the current level of bycatch and the consequences that result from fishing this species. The term, "bycatch" used in this document excludes incidental catch of a species for which an adequate management framework exists. The terms, "endangered, threatened, or protected," used in this document refer to species status that is determined by national legislation such as the U.S. Endangered Species Act, the U.S. Marine Mammal Protection Act (or another nation's equivalent), the IUCN Red List, or a credible scientific body such as the American Fisheries Society.

1.00 Bycatch in this fishery is high (>100% of targeted landings), OR regularly includes a "threatened, endangered or protected species."

2.00 Bycatch in this fishery is moderate (10-99% of targeted landings) AND does not regularly include "threatened, endangered or protected species" OR level of bycatch is unknown.

Quantitative estimates of non-halibut bycatch in directed Atlantic Halibut fisheries are not available. In Canada, white hake, cusk, Atlantic cod, dogfish, and several other species are caught in association with Atlantic Halibut. Incidental capture of in the Atlantic Halibut fishery is estimated to be moderate, between 46 and 69% of the catch (Zwanenburg et al. 2003). It is unknown whether these species are landed or discarded. In the U.S., there is currently no directed Atlantic Halibut fishery (NOAA 2006).

3.00 Bycatch in this fishery is low (<10% of targeted landings) and does not regularly include "threatened, endangered or protected species."

Points of Adjustment (multiple selections allowed)

-0.25 Bycatch in this fishery is a contributing factor to the decline of "threatened, endangered, or protected species" and no effective measures are being taken to reduce it.

There are no published estimates of bycatch of other species in the Halibut fishery, so no points were subtracted.

-0.25 Bycatch of targeted or non-targeted species (e.g., undersize individuals) in this fishery is high and no measures are being taken to reduce it.

In Canada, incidental capture of non-halibut species in the Atlantic Halibut fishery is estimated to be high, between 46 and 69% of the catch (Zwanenburg et al. 2003). Concerning bycatch of Atlantic Halibut, kept halibut information from observer data indicate that even after the 91 cm minimum size requirement, mean lengths of kept
halibut generally ranged from 80-90 cm (~ages 5.5-6.5), with minimum sizes of kept halibut generally ranging from 40-50cm (~ages 2.5-3.5). Discarded halibut mean lengths have ranged from 27-70cm (~ages 2-5), with minimum discard lengths generally ranging from 20-40cm (~ages 1-3) (Col and Legault 2008). Regulation of the minimum size is a concern since it appears that even with current regulations, there are undersized animals being taken.

-0.25 Bycatch of this species (e.g., undersize individuals) in other fisheries is high OR bycatch of this species in other fisheries inhibits its recovery, and no measures are being taken to reduce it.

-0.25 The continued removal of the bycatch species contributes to its decline.

There are no published estimates of bycatch of other species in the Halibut fishery, so no points were subtracted.

+0.25 Measures taken over a major portion of the species range have been shown to reduce bycatch of "threatened, endangered, or protected species" or bycatch rates are no longer deemed to affect the abundance of the "protected" bycatch species OR no measures needed because fishery is highly selective (e.g., harpoon; spear).

+0.25 There is bycatch of targeted (e.g., undersize individuals) or non-targeted species in this fishery and measures (e.g., gear modifications) have been implemented that have been shown to reduce bycatch over a large portion of the species range OR no measures are needed because fishery is highly selective (e.g., harpoon; spear).

+0.25 Bycatch of this species in other fisheries is low OR bycatch of this species in other fisheries inhibits its recovery, but effective measures are being taken to reduce it over a large portion of the range.

Survival of Atlantic Halibut discarded from longline gear is estimated to be 77%, whereas survival of discards from otter trawl gear was estimated to be substantially lower at 35% (Neilson et al. 1989). Selectivity of Atlantic Halibut likely starts around age 2 (30 cm) for bottom trawl gear, whereas selectivity from longline gear likely occurs at older ages around 6-7 years (Col and Legault 2009). Both of these fisheries take mostly immature fish, which may be inhibiting recovery, but there are some efforts being taken to reduce these impacts. In Canada, shrimp trawlers are now using bycatch reduction devices for groundfish, called Nordmore grates (DFO 2004). Increases in the abundance of small Atlantic Halibut in the Gulf of St. Lawrence in recent years is likely the result of a moratorium on cod and redfish trawling operations as well as the implementation of Nordmore grates (DFO 2004). In addition, bycatch of Atlantic Halibut in groundfish fisheries is managed through caps (NOAA 2006).
The continued removal of the bycatch species in the targeted fishery has had or will likely have little or no impact on populations of the bycatch species OR there are no significant bycatch concerns because the fishery is highly selective (e.g., harpoon; spear).

**2.00 Points for Bycatch**

**REFERENCES**


