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Atlantic Halibut

by

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Distribution, Biology and Management

The Atlantic halibut (*Hippoglossus hippoglossus*) is the largest species of flatfish found in the northwest Atlantic Ocean. This long-lived, late-maturing flatfish is distributed from Labrador to southern New England (Bigelow and Schroeder 1953). In the Gulf of Maine-Georges Bank region (Figure 13.1), halibut supported important commercial fisheries from the early-1800s to the 1880s (Hennemuth and Rockwell 1987). The population was heavily overfished in the 19th and early 20th centuries and has not recovered. There is currently no directed fishery for Atlantic halibut within federal waters of the U.S. EEZ, although some small-scale harvests occur within state waters off of Maine. Virtually all landings from the Gulf of Maine-Georges Bank stock region occur as bycatch in U.S. or Canadian groundfish fisheries.

Adult Atlantic halibut range in length from 80 cm to 220 cm in the Gulf of Maine-Georges Bank region. The largest halibut reported captured in U.S. waters was 280 kg dressed weight (headed and gutted) and was captured 88 km off Cape Ann (Collette and MacPhee 2002). Females typically grow faster and achieve greater sizes than males. Maximum age is reported to be 50 years. Most of the U.S. bycatch of Atlantic halibut consists of age-5 to age-10 fish weighing between 20 to 40 kg. Atlantic halibut reach sexual maturity between 5 to 15 years and the median female age of maturity in the Gulf of Maine-Georges Bank region is about 7 years (Sigourney et al. 2006). There have been no reports of Atlantic halibut spawning in the Gulf of Maine-Georges Bank region in recent years. In general, Atlantic halibut spawn once per year in synchronous groups during late winter through early spring (Neilson et al. 1993). Females can produce up to 7 million eggs per year depending on size (Haug and Gulliksen 1988). Spawning is believed to occur in waters of the upper continental slope at depths of 200 m or greater (Scott and Scott 1988).

The U.S. fishery for Atlantic halibut is managed under the New England Fishery Management Council's Multispecies Fishery Management Plan (FMP) (NEFMC 2003). Management measures for Atlantic halibut currently include a moratorium on directed harvests, a bycatch

limit of one legal-sized fish per trip, and a minimum fish size of 91cm (36 inches).

The Fishery

The directed Atlantic halibut fishery in the Georges Bank-Gulf of Maine region began in early 1800s. Fishing grounds included inshore waters of Massachusetts Bay, Nantucket shoals, the coast of Cape Cod, Barnstable Bay and Cashes Ledge (Goode 1884). Halibut were apparently exceedingly abundant in Massachusetts Bay with one vessel catching 6.8 mt (15,000 lbs) on a single two-day trip in 1837 (Goode 1884). Halibut abundance gradually declined on the inshore fishing grounds and the fishing fleets moved on to harvest halibut on Georges Bank in the 1830s and 1840s. By 1848, the Georges Bank halibut fishery was very productive with reports that “Vessels could easily catch a fare of 50,000 pounds [23 mt] of fish in two days.” (attributed to Captain Epes Merchant, Goode 1884). The directed fishery in the Gulf of Maine-Georges Bank continued into the early 20th century when the heavily-fished stock appears to have reached the point of collapse.

Reliable records of Atlantic halibut landings from the Gulf of Maine-Georges Bank region begin in 1893 (Figure 13.2). Substantial landings occurred prior to this, however, as the halibut fishery was already in decline by the 1880s (Hennemuth and Rockwell 1987). Landings decreased through the early-1900s as components of the resource were sequentially depleted. Annual landings averaged 662 mt during 1893-1940 but experienced a 4-fold decrease to average only 144 mt during 1941-1976. During 1977-2000, annual landings continued to decline and fell to an average of 89 mt per year.

The total commercial fishery landings of Gulf of Maine-Georges Bank Atlantic halibut was 35 mt in 2005, slightly higher than the record low of 17 mt in 1998 (Table 13.1, Figure 13.2). Of the 2005 landings, 17 mt (49%) were landed by U.S. fishermen and 18 mt (51%) were landed by Canadian fishermen. Annual Atlantic halibut landings averaged only 29 mt during 2001-2005, less than one-third of the average annual landings during 1977-2000. Recreational catches of Atlantic halibut are negligible.

Research Vessel Survey Indices

The NEFSC spring and fall bottom trawl surveys provide measures of the relative abundance of Atlantic halibut within the Gulf of Maine-Georges Bank region (Figure 13.3). Both biomass indices have high interannual variability since relatively few halibut are captured on these surveys. In some years, no halibut are caught.

Assessment Results

The status of the Gulf of Maine-Georges Bank Atlantic halibut stock is assessed based on research vessel survey indices and commercial catch, and the information provided herein reflects the results of the most recent peer-reviewed assessment (Brodziak and Col 2005). The halibut stock is classified as being overfished when the 5-year average of the NEFSC autumn survey swept-area biomass index falls below 2,700 mt, which is one-half of the B_{MSY} proxy of $B_{MSY} = 5,400$ mt (Brodziak and Col 2005). Stock biomass has been relatively constant but has

remained well below the overfished threshold since the 1960s (Figure 13.4). As a result, the stock has been in an overfished condition throughout the entire survey time series. In 2004, the 5-year average swept-area biomass was 288 mt, roughly 5% of the B_{MSY} target.

Overfishing on the Gulf of Maine-Georges Bank halibut stock occurs when fishing mortality exceeds the limit of $F_{MSY}=0.06$ (NEFSC 2002). Overfishing status cannot be determined because no estimates of fishing mortality are available. Nonetheless, exploitation rate indices (calculated as the annual catch divided by the 5-year average swept-area biomass) suggest that exploitation rates have probably been stable since the 1970s, and have declined during the 1990s (Figure 13.5). In 2004, the exploitation rate index was 0.09, or about 80% below the long-term average.

Biological Reference Points

Biological reference points for the Gulf of Maine-Georges Bank Atlantic halibut stock were determined by the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish (NEFSC 2002). The Working Group used catch and survey data from the 2001 halibut assessment to evaluate survey-based proxies for MSY-based reference points (Table 13.2). The Working Group agreed on the following estimates that were subsequently used in Amendment 9 to the FMP (NEFMC 1998): $MSY=300$ mt, $B_{MSY}=5,400$ mt and $F_{MSY}=0.06$.

Summary

The Atlantic halibut stock in the Gulf of Maine-Georges Bank region was heavily overfished in the 19th and early 20th centuries. No recovery has occurred. Stock biomass remains well below B_{MSY} . Fishing mortality on the stock is unknown but exploitation rate indices have remained stable since the 1970s. Overall, the Gulf of Maine-Georges Bank Atlantic halibut stock remains in a depleted condition.

Table 13.1 Recreational and commercial landings of Georges Bank-Gulf of Maine Atlantic halibut (metric tons).

Category	1986-95 Average	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
U. S. Recreational	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States	24.7	13.0	14.0	8.0	12.0	11.0	11.0	10.0	17.0	11.0	17.0
Canada	44.6	12.0	14.0	9.0	8.0	6.0	11.0	10.0	14.0	19.0	18.0
Other	-	-	-	-	-	-	-	-	-	-	-
Total Nominal Catch	69.3	25.0	28.0	17.0	20.0	17.0	22.0	20.0	31.0	30.0	35.0

Table 13.2 Summary of MSY-based reference points for Gulf of Maine-Georges Bank Atlantic halibut.

MSY-based Reference Points

MSY = 300 mt

B_{MSY} = 5,400 mt
 F_{MSY} = 0.06

For further information

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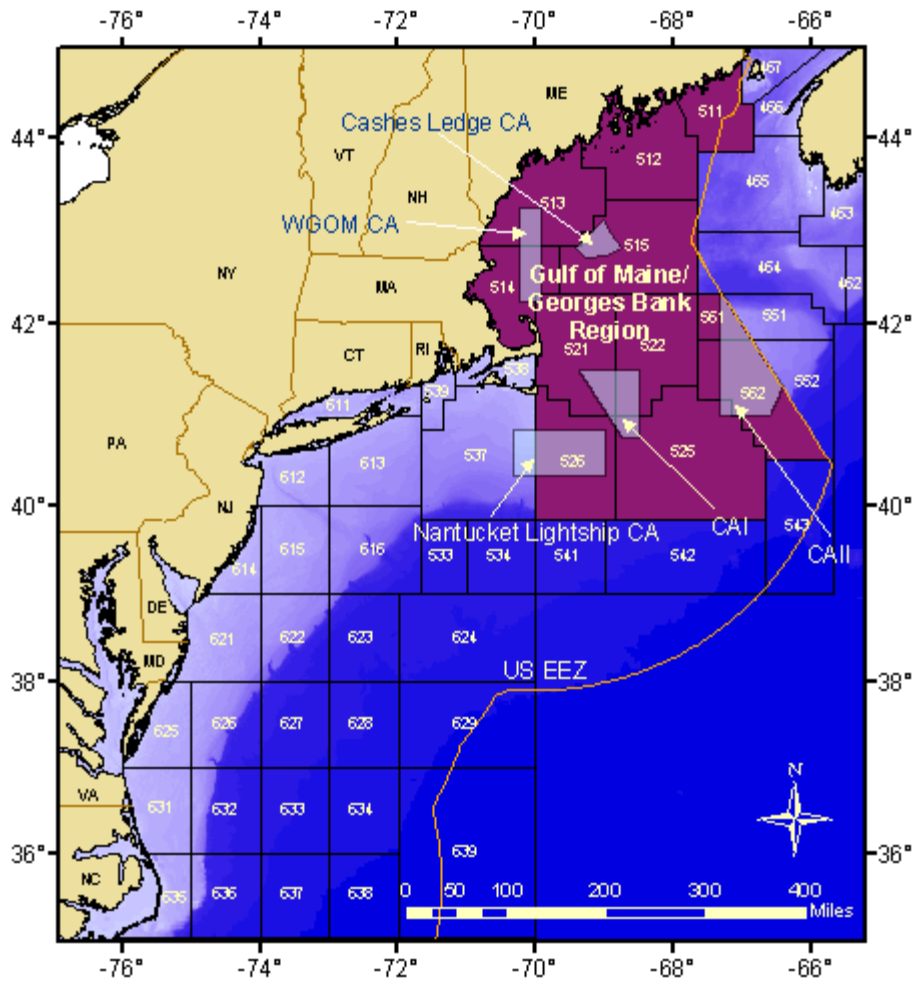


Figure 13.1. Statistical areas used to define the Gulf of Maine/Georges Bank region of the Atlantic halibut stock.

Atlantic Halibut Total Commercial Landings

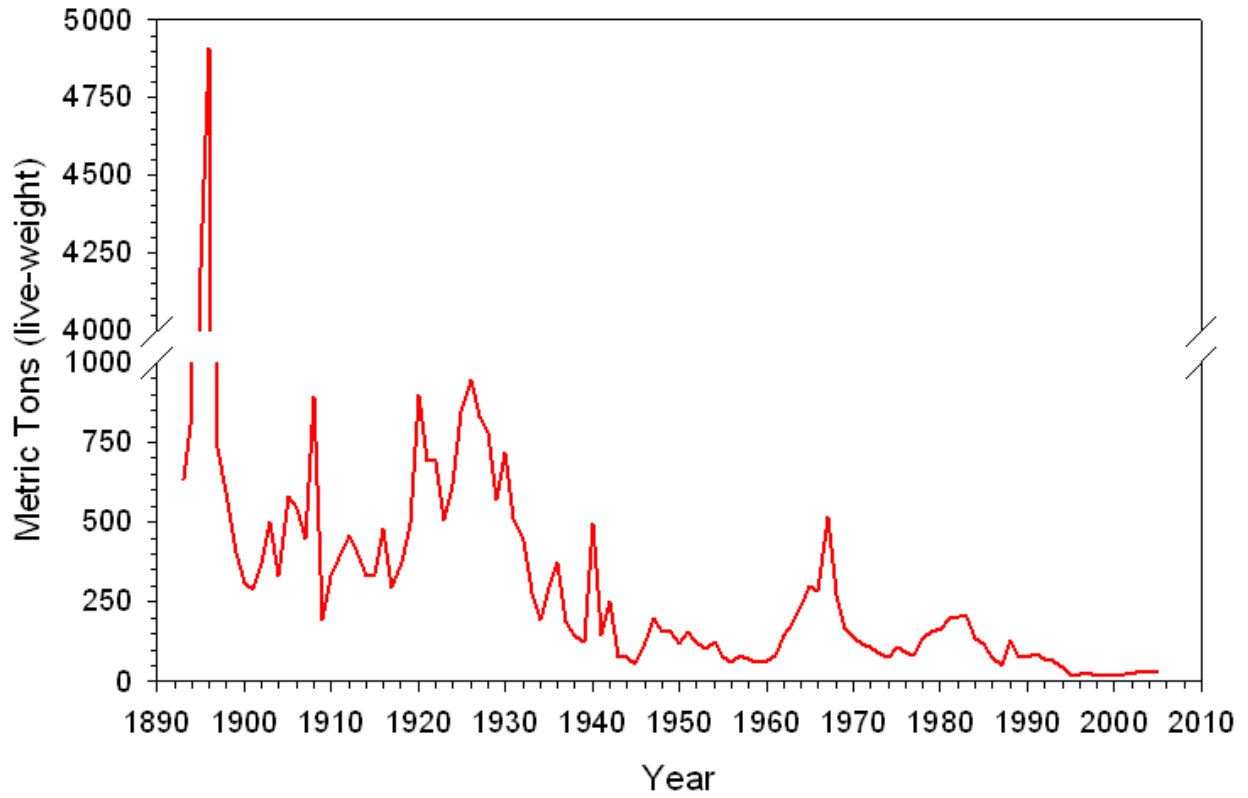


Figure 13.2. Total commercial landings of Atlantic halibut from the Gulf of Maine-Georges Bank region, 1893-2005.

Atlantic Halibut NEFSC Spring and Autumn Biomass Indices

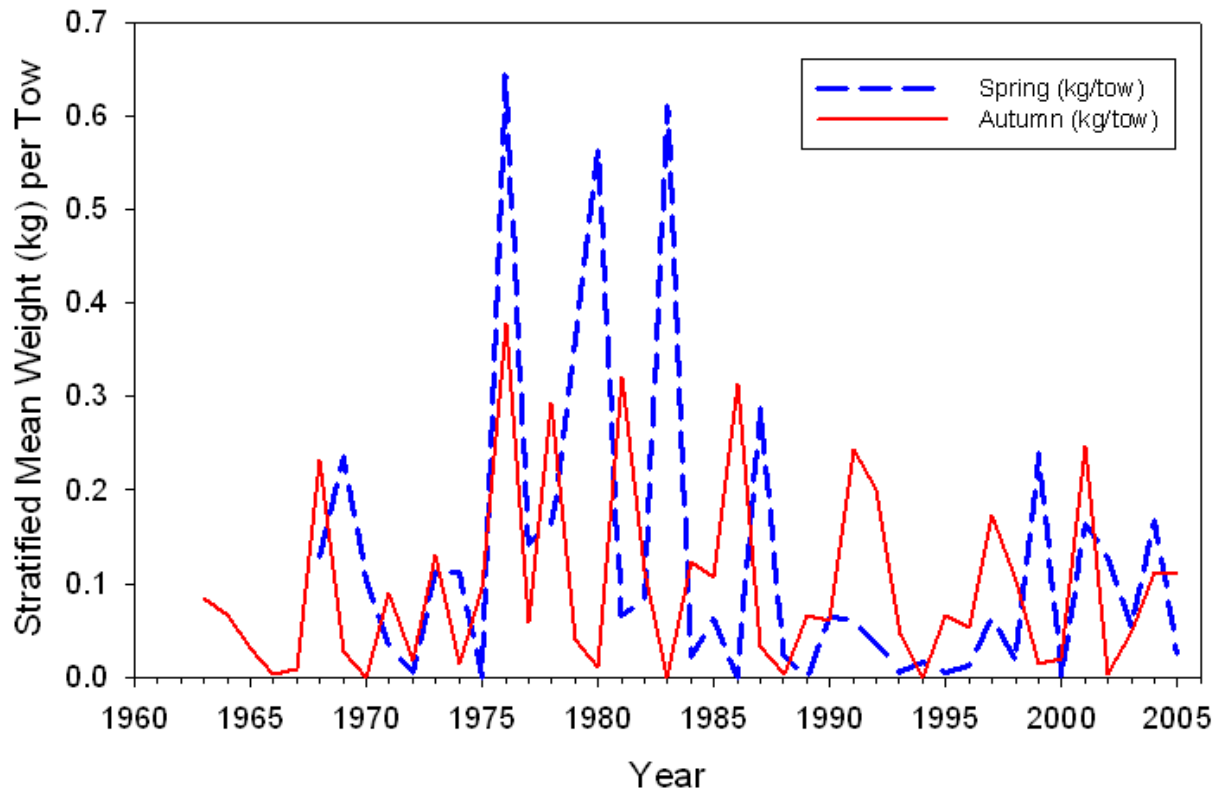


Figure 13.3. Biomass indices (stratified mean weight per tow) for Atlantic halibut from NEFSC spring and autumn research vessel surveys.

Atlantic Halibut Swept-Area Biomass v. BMSY

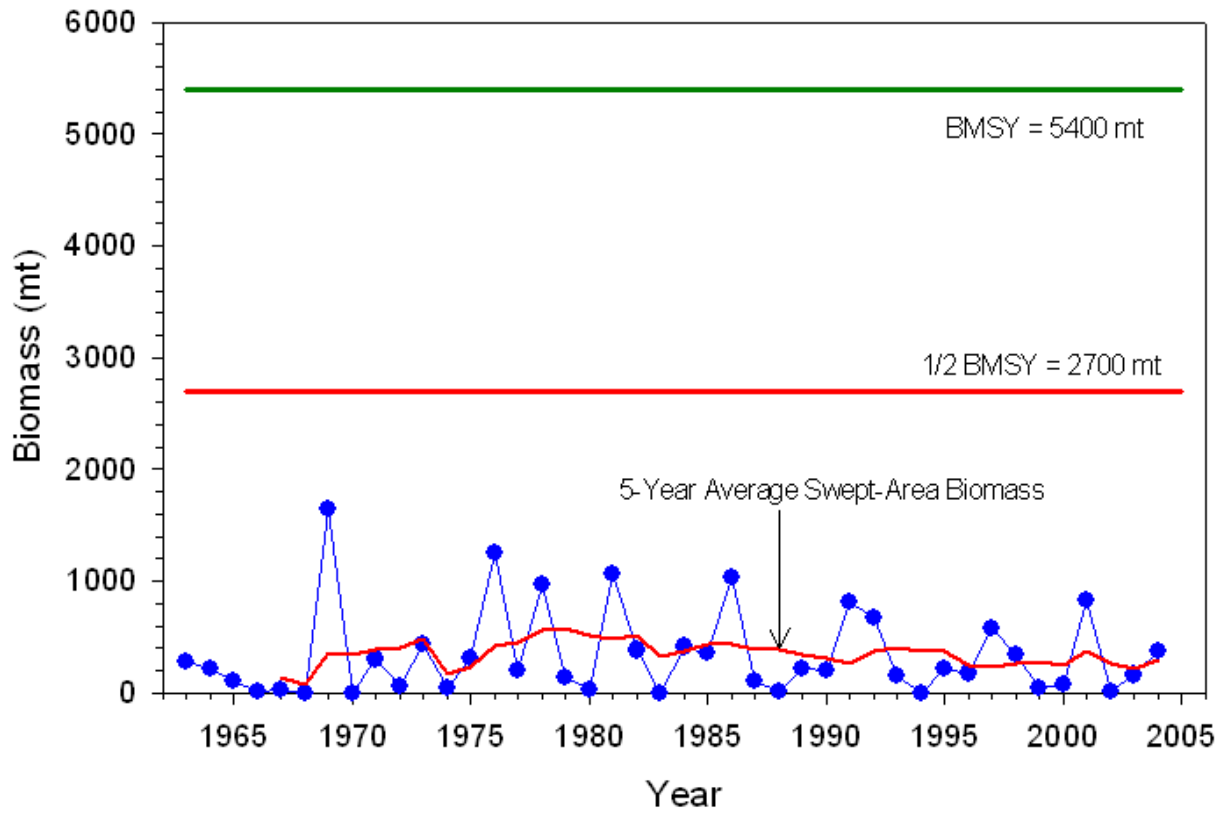


Figure 13.4. Trends in swept-area biomass indices (mt) of Atlantic halibut from NEFSC autumn bottom trawl surveys.

Atlantic Halibut Exploitation Index, Landings, and Swept-Area Biomass Index

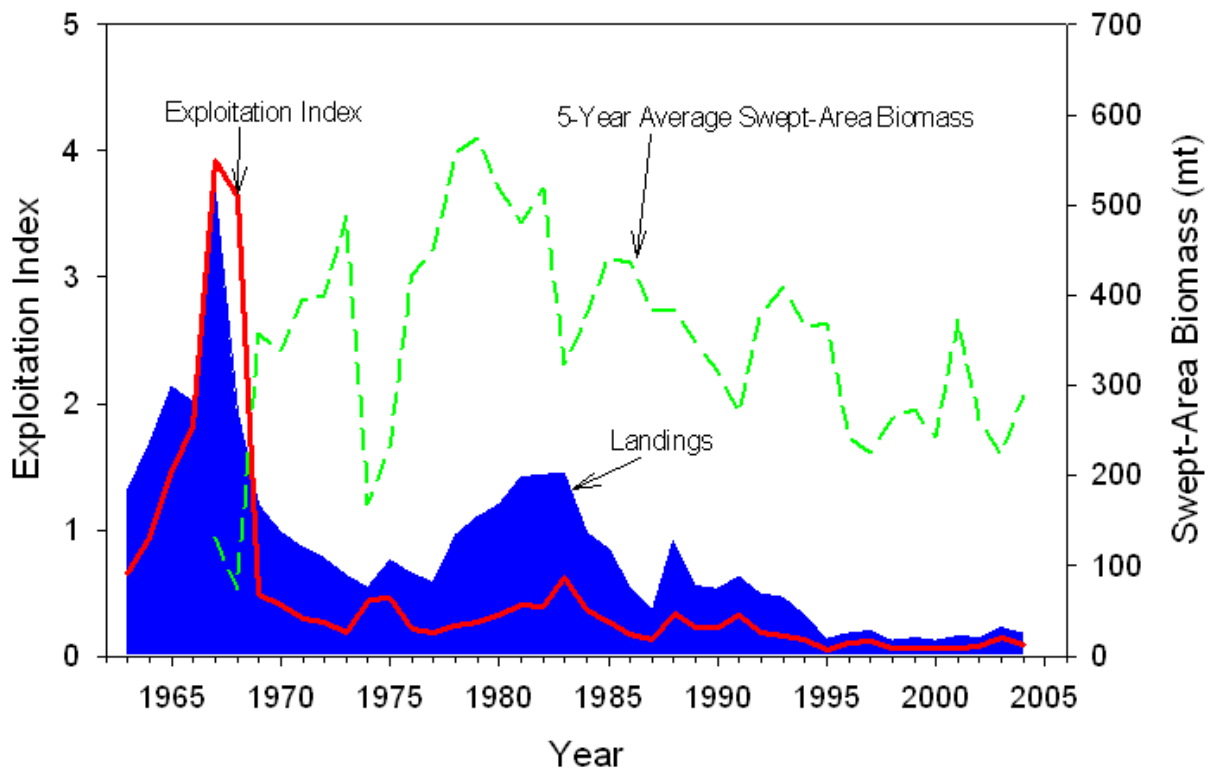


Figure 13.5. Trends in Atlantic halibut commercial landings, fall stratified swept-area biomass, and exploitation index calculated as annual landings divided by the 5-year moving average of the swept-area biomass index.