

1.0 Background

The Atlantic halibut (*Hippoglossus hippoglossus*) is distributed from Labrador to southern New England in the northwest Atlantic (Bigelow and Schroeder 1953). The Atlantic halibut stock within Gulf of Maine-Georges Bank waters (NAFO Subarea 5) has been exploited since the 1830s. The Gulf of Maine-Georges Bank Atlantic halibut stock was last assessed in 2001 by the Northern Demersal Working Group (NEFSC 2001). The stock was overfished based on research survey indices and is not expected to rebuild in the near future. In this report, we update the Atlantic halibut assessment using fishery data for 2001 and available survey data for 2001-2002. Updated survey biomass indices are used for stock status determination.

2.0 Assessment for 2002

2.1 2001 Landings

Records of Atlantic halibut landings from the Gulf of Maine and Georges Bank begin in 1893 (Table S1, Figure S1). Substantial landings occurred prior to this, however, as the halibut fishery declined in the late 1800s (Hennemuth and Rockwell 1987). Landings have decreased since the 1890s as components of the resource have been sequentially depleted. Annual landings averaged 662 mt during 1893-1940 and declined to an average of 144 mt during 1941-1976. During 1977-2000, landings have averaged 89 mt-yr⁻¹. Reported landings in 2001 were 22 mt. Of these, 11 mt (50%) were landed by domestic fishermen with the remainder landed by Canadian fishermen (Division 5Zc).

2.2 Survey Indices

The Northeast Fisheries Science Center spring and autumn bottom trawl surveys provide measures of the relative abundance of Atlantic halibut within the Gulf of Maine and Georges Bank region (offshore survey strata 13-30 and 36-40, Table S2). Both indices have high inter-annual variability since relatively few halibut are captured during these surveys; in some years, no halibut are caught. The survey indices suggest that relative abundance increased during the 1970s to early 1980s and subsequently declined in the 1990s. It is unknown whether abundance trends in the Gulf of Maine and Georges Bank region have been influenced by changes in the seasonal distribution and availability of Atlantic halibut, however. US spring survey indices were computed for 2001-2002 (Table S2, Figure S2) and US autumn survey indices were computed for 2001 (Table S2, Figure S2) using standardized data.

3.0 Assessment Results

Based on updated spring and autumn survey data, Atlantic halibut biomass within the Gulf of Maine and Georges Bank region remains low. Swept-area biomass indices in spring 2001 and 2002 were 544 and 425 mt with a 5-year average of 312 mt in 2001 (Figure S3). Autumn swept-area biomass in 2000 was 123 mt with a 5-year average of 232 mt in 2001 (Figure S3). Thus, stock biomass, as indexed by the 5-year moving average of autumn swept-area biomass, was below the biomass threshold of 2,700 mt (Figure S3). Although no estimates of fishing mortality are available, exploitation rate indices (annual landings/5-year moving average of survey index) suggest that exploitation rates have probably been stable since the 1970s, and may have declined during the 1990s (Figure 4). Thus, the Atlantic halibut stock in the Gulf of Maine and Georges Bank region remains depleted and exploitation rates do not appear to have increased since the 1970s.

4.0 Sources of Uncertainty

- Fishery-dependent information on the size and age composition of Atlantic halibut landings is limited, although an experimental fishery in the Gulf of Maine during 2000-2002 has provided some valuable fishery-dependent data (Sigourney 2002).
- Stock structure of Atlantic halibut within the Gulf of Maine and Georges Bank region is uncertain. Wise and Jensen (1959) documented movements of tagged Atlantic halibut between Georges Bank and Browns Bank, but it is difficult to draw any definite conclusions about movement rates from their study. Recently, one halibut released near Stonington, Maine in April 2000 during the Gulf of Maine experimental fishery was recaptured off Port au Basque, Newfoundland in May 2002 after growing from 32 to 40 inches in total length (Kohl Kanwit, Maine DMF, personal communication). To date, preliminary data indicate three recaptures of fish tagged in the experimental fishery during 2000-2002 within Canadian waters.
- The portion of the Atlantic halibut population within Gulf of Maine and Georges Bank region is a transboundary stock. Conservation measures for both USA and Canadian fisheries may be needed to rebuild this stock.

5.0 Summary Stock Status

Biological Reference Points

For Gulf of Maine-Georges Bank Atlantic halibut, the stock biomass index (B_{MSY}) and the proxy exploitation rate index (F_{MSY}) to produce MSY are $B_{MSY} = 5,400$ mt and $F_{MSY} = 0.06$ (NEFMC 1998, NEFSC 2002). The overfished threshold ($B_{THRESHOLD}$) for Atlantic halibut is $B_{THRESHOLD} = \frac{1}{2} B_{MSY} = 2,700$ mt. The overfishing threshold ($F_{THRESHOLD}$) for Atlantic halibut is $F_{THRESHOLD} = F_{MSY} = 0.06$.

Stock Status in 2001

In 2001, the stock biomass index was 232 mt (9% of $B_{THRESHOLD}$ and 4% of B_{MSY}) with a standard error of 50 mt. Based on the point estimate of the biomass index, the Gulf of Maine-Georges Bank Atlantic halibut stock was overfished in 2001. In 2001, no estimate of fishing mortality was available and overfishing status was unknown.

6.0 References

Bigelow, H.B, and Schroeder, W.C. 1953. Fishes of the Gulf of Maine. Fishery Bulletin of the Fish and Wildlife Service, No. 74, 577 pp.

Hennemeth, R.C., and Rockwell, S. 1987. History of fisheries conservation and management. *In* Georges Bank. *Edited by* R. Backus, R. Price, and D. Bourne. MIT Press, Cambridge, MA. pp. 431-446.

New England Fishery Management Council. 1998. Evaluation of existing overfishing definitions and recommendations for new overfishing definitions to comply with the Sustainable Fisheries Act. NEFMC, 50 Water Street, Mill 2 Newburyport, MA 01950.

Northeast Fisheries Science Center. 2001. Assessment of 19 Northeast groundfish stocks through 2000. NEFSC Reference Document 01-20, Woods Hole, MA, 02543.

Northeast Fisheries Science Center. 2002. Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish. NEFSC Reference Document 02-04, Woods Hole, MA 02543.

Sigourney, D. B. 2002. Biology of the Atlantic halibut (*Hippoglossus hippoglossus*) in the Gulf of Maine-Georges Bank region. M.Sc. Thesis, Univ. Mass. Amherst, Amherst, MA 01003.

Wise, J.P., and Jensen, A.C. 1959. Movement of tagged halibut off New England. Trans. Amer. Fish. Soc. 88:357-358.

Table SI. Reported landings (mt) of Atlantic halibut from the Gulf of Maine and Georges Bank, 1893-2001.									
Year	USA	Canada	Other	Total	Year	USA	Canada	Other	Total
1893	634	0	0	634	1947	196	0	0	196
1894	843	0	0	843	1948	156	0	0	156
1895	4200	0	0	4200	1949	157	0	0	157
1896	4908	0	0	4908	1950	116	0	0	116
1897	733	0	0	733	1951	154	0	0	154
1898	564	0	0	564	1952	123	0	0	123
1899	407	0	0	407	1953	104	0	0	104
1900	311	0	0	311	1954	125	0	0	125
1901	287	0	0	287	1955	74	0	0	74
1902	367	0	0	367	1956	62	0	0	62
1903	502	0	0	502	1957	80	0	0	80
1904	332	0	0	332	1958	73	0	0	73
1905	580	0	0	580	1959	59	0	0	59
1906	542	0	0	542	1960	63	0	0	63
1907	447	0	0	447	1961	79	5	0	84
1908	891	0	0	891	1962	86	35	25	146
1909	193	0	0	193	1963	94	88	1	183
1910	329	0	0	329	1964	115	120	1	236
1911	389	0	0	389	1965	128	153	18	299
1912	460	0	0	460	1966	110	110	62	282
1913	402	0	0	402	1967	102	386	26	514
1914	329	0	0	329	1968	74	193	3	270
1915	336	0	0	336	1969	63	96	9	168
1916	478	0	0	478	1970	52	67	19	138
1917	293	0	0	293	1971	81	38	0	119
1918	375	0	0	375	1972	63	37	8	108
1919	496	0	0	496	1973	51	38	0	89
1920	896	0	0	896	1974	46	29	1	76
1921	689	0	0	689	1975	70	36	0	106
1922	694	0	0	694	1976	58	33	0	91
1923	508	0	0	508	1977	50	31	0	81
1924	616	0	0	616	1978	84	50	0	134
1925	843	0	0	843	1979	125	29	0	154
1926	944	0	0	944	1980	80	88	0	168
1927	831	0	0	831	1981	80	118	0	198
1928	781	0	0	781	1982	85	116	0	201
1929	570	0	0	570	1983	72	131	0	203
1930	716	0	0	716	1984	75	62	0	137
1931	511	0	0	511	1985	61	57	0	118
1932	443	0	0	443	1986	44	32	0	76
1933	279	0	0	279	1987	27	23	0	50
1934	192	0	0	192	1988	47	81	0	128
1935	292	0	0	292	1989	13	65	0	78
1936	374	0	0	374	1990	16	58	0	74
1937	187	0	0	187	1991	30	58	0	88
1938	146	0	0	146	1992	22	47	0	69
1939	124	0	0	124	1993	15	50	0	65
1940	497	0	0	497	1994	22	24	0	46
1941	145	0	0	145	1995	11	8	0	19
1942	250	0	0	250	1996	13	12	0	25
1943	76	0	0	76	1997	14	14	0	28
1944	77	0	0	77	1998	8	9	0	17
1945	55	0	0	55	1999	12	8	0	20
1946	124	0	0	124	2000	11	6	0	17
					2001	11	11	0	22

Table S2. Stratified mean weight (kg) per tow of Atlantic halibut from NEFSC spring ¹ and autumn surveys (offshore strata 13-30, 36-40) and exploitation rate indices calculated as annual landings divided by the 5-year moving average of swept-area biomass indices.						
Year	Spring Survey Index	Autumn Survey Index	Spring Exploitation Rate Index	Autumn Exploitation Rate Index		
1963		0.085				
1964		0.067				
1965		0.032				
1966		0.004				
1967		0.009		3.93		
1968	0.129	0.000		3.63		
1969	0.236	0.494		0.47		
1970	0.105	0.000		0.41		
1971	0.033	0.091		0.30		
1972	0.005	0.018	0.32	0.27		
1973	0.113	0.131	0.27	0.18		
1974	0.112	0.014	0.31	0.45		
1975	0.000	0.095	0.61	0.46		
1976	0.644	0.378	0.16	0.22		
1977	0.142	0.059	0.12	0.18		
1978	0.163	0.294	0.19	0.24		
1979	0.357	0.040	0.18	0.27		
1980	0.563	0.010	0.14	0.32		
1981	0.066	0.321	0.23	0.41		
1982	0.082	0.115	0.25	0.39		
1983	0.611	0.000	0.18	0.63		
1984	0.022	0.124	0.15	0.36		
1985	0.063	0.106	0.21	0.27		
1986	0.000	0.313	0.15	0.17		
1987	0.287	0.033	0.08	0.13		
1988	0.023	0.004	0.49	0.33		
1989	0.000	0.066	0.32	0.23		
1990	0.064	0.060	0.30	0.23		
1991	0.062	0.243	0.30	0.33		
1992	0.037	0.201	0.56	0.18		
1993	0.006	0.046	0.58	0.16		
1994	0.017	0.000	0.37	0.13		
1995	0.005	0.066	0.23	0.05		
1996	0.013	0.053	0.48	0.10		
1997	0.063	0.174	0.41	0.12		
1998	0.017	0.103	0.22	0.06		
1999	0.239	0.015	0.09	0.07		
2000	0.000	0.021	0.08	0.07		
2001	0.164	0.037	0.07	0.09		
2002	0.128					

Figure S1. Atlantic halibut landings from the Gulf of Maine-Georges Bank region during 1893-2001.

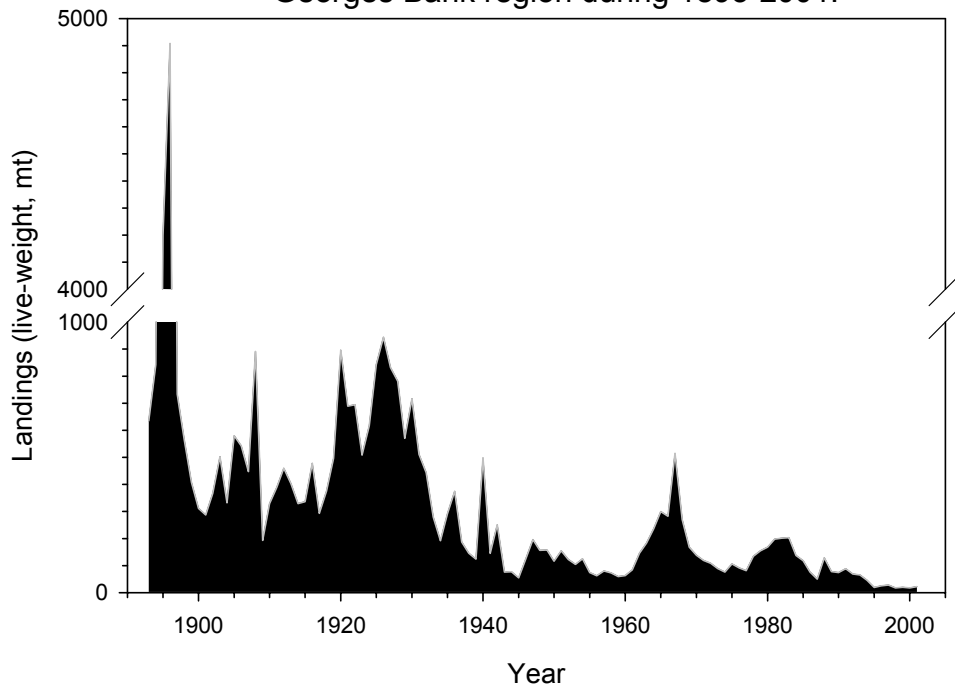


Figure S2. Trends in swept-area biomass indices (mt) of Atlantic halibut from NEFSC spring and autumn bottom trawl surveys.

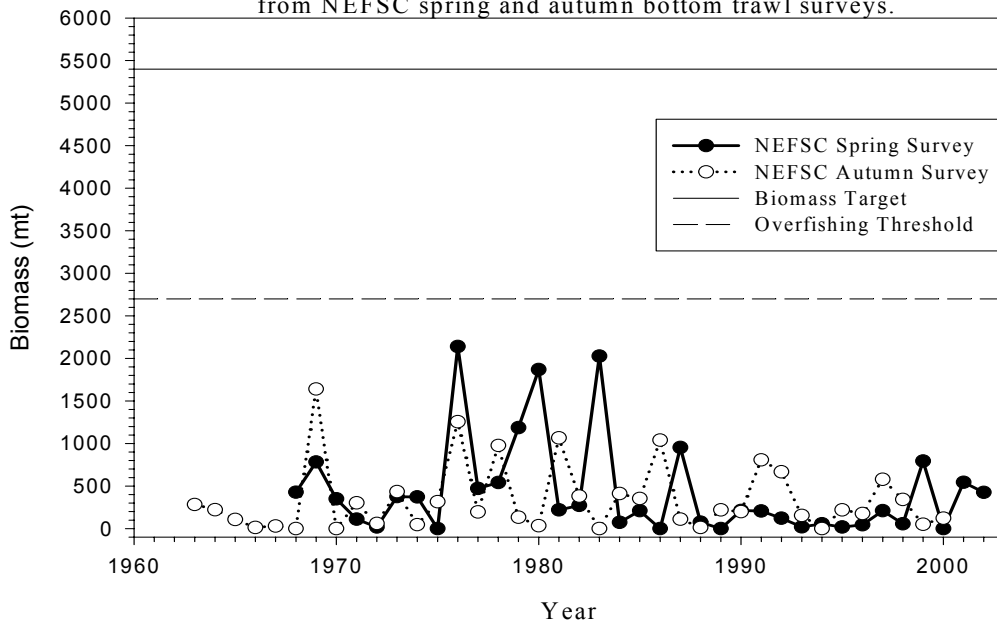


Figure S3. Trends in Atlantic halibut landings from the Gulf of Maine and Georges Bank in comparison to 5-year moving averages of spring and autumn survey indices, 1967-2001.

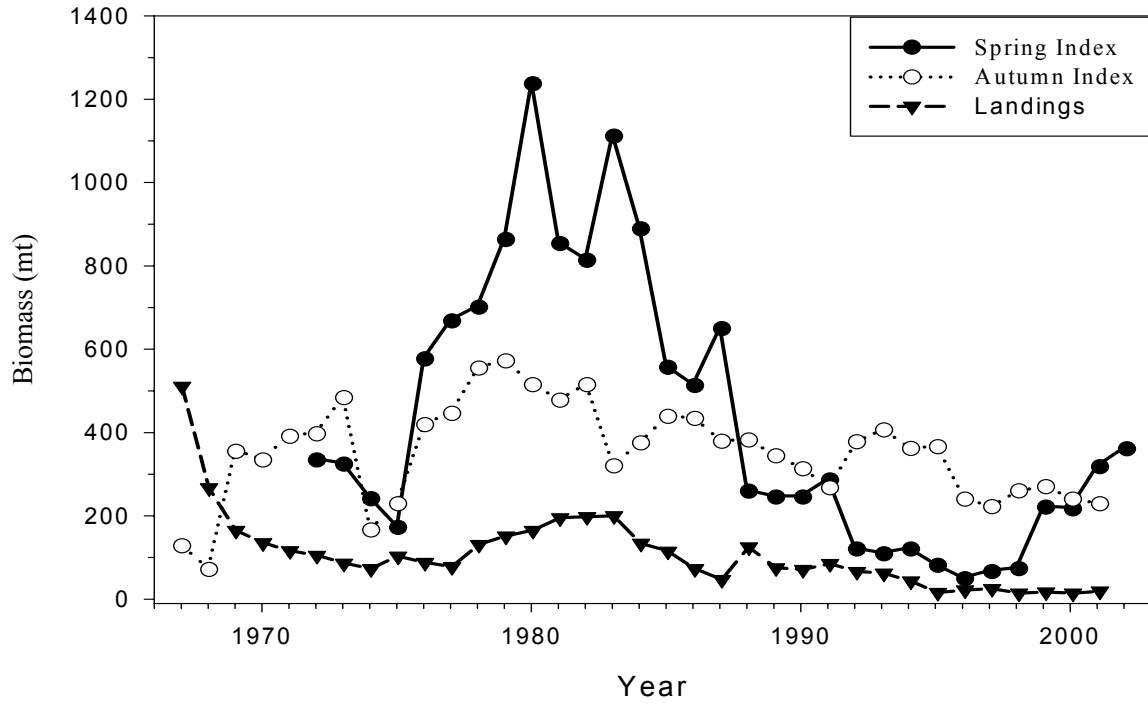


Figure S4. Trends in exploitation rate indices for Atlantic halibut from the Gulf of Maine and Georges Bank based on 5-year moving averages of NEFSC spring and autumn survey indices, 1967-2001

