

**TABLE 1: AVAILABLE DATA**

<b>COMMON NAME:</b>	ATLANTIC COD	<b>SPECIES:</b>	<i>Gadus morhua</i>
<b>AREA:</b>	NORTHWEST ATLANTIC	<b>STOCK:</b>	GEORGES BANK AND SOUTH (NAFO DIV. 5Z+SUBAREA 6)
<b>CREATED BY:</b>	LORETTA O'BRIEN 2000-7-3	<b>UPDATED BY:</b>	ED TRIPPEL 2003-2-3

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
2001	✓	✓	✓	(✓)	✓		✓	(✓)	
2000	✓	✓	✓	(✓)	✓	✓	✓	(✓)	(✓)
1999	✓	✓	✓	(✓)	✓	✓	✓	(✓)	(✓)
1998	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1997	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1996	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1995	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1994	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1993	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1992	✓	✓	✓	(✓)	✓		✓	(✓)	(✓)
1991	✓	✓	✓	(✓)	✓		✓		(✓)
1990	✓	✓	✓	(✓)	✓		✓		(✓)
1989	✓	✓	✓	(✓)	✓		✓		(✓)
1988	✓	✓	✓	(✓)	✓		✓		(✓)
1987	✓	✓	✓	✓	✓		✓		(✓)
1986	✓	✓	✓	✓	✓		✓		(✓)
1985	✓	✓	✓	✓	✓		✓		(✓)
1984	✓	✓	✓	✓	✓		✓		(✓)
1983	✓	✓	✓	✓	✓		✓		(✓)
1982	✓	✓	✓	✓	✓		✓		(✓)
1981	✓	✓	✓	✓	✓		✓		(✓)
1980	✓	✓	✓	✓	✓		✓		(✓)
1979	✓	✓	✓	✓	✓		✓		(✓)
1978	✓	✓	✓	✓	✓		✓		(✓)
1977	(✓)	✓	✓	✓	✓				(✓)
1976	(✓)	✓	✓	✓	✓				(✓)

<b>Data status</b>									
<b>Year</b>	<b>Stock size</b>	<b>Stock composition</b>	<b>Age</b>	<b>Sex ratio</b>	<b>Maturity</b>	<b>Fecundity</b>	<b>Weight</b>	<b>Condition</b>	<b>Additional data</b>
<b>1975</b>	(✓)	✓	✓	✓	✓				(✓)
<b>1974</b>	(✓)	✓	✓	✓	✓				(✓)
<b>1973</b>	(✓)	✓	✓	✓	✓				(✓)
<b>1972</b>	(✓)	✓	✓	✓	✓				(✓)
<b>1971</b>	(✓)	✓	✓	✓	✓				(✓)
<b>1970</b>	(✓)	✓	✓	✓	✓				(✓)
<b>1969</b>	(✓)	✓							(✓)
<b>1968</b>	(✓)	✓							(✓)
<b>1967</b>	(✓)	✓							(✓)
<b>1966</b>	(✓)	✓							(✓)
<b>1965</b>	(✓)	✓							(✓)
<b>1964</b>	(✓)	✓							(✓)
<b>1963</b>	(✓)	✓							(✓)

**TABLE 2: DATA BASIS, FORMAT AND QUALITY**

<b>COMMON NAME:</b>	ATLANTIC COD	
<b>AREA:</b>	NORTHWEST ATLANTIC	
<b>STOCK:</b>	GEORGES BANK AND SOUTH (NAFO DIV. 5Z+SUBAREA 6)	
<b>REPRODUCTIVE STRATEGY:</b>	DETERMINATE BATCH SPAWNER	<b>REF. NO.:</b>
<b>TIMING OF SPAWNING:</b>	NOVEMBER-MAY	<b>REF. NO.:</b>
<b>OPTIMAL TIME FOR MATURITY SAMPLING:</b>	JANUARY-FEBRUARY	<b>REF. NO.:</b>

Data basis, format and quality						
Variables	Year range	Data basis (A/L/W)	Data origin	Sampling frequency	Notes on data, methods and contents	Ref. No.
Stock size	1963-1977	A,L	S	B	Relative abundance	2
	1978-2001	A,L	CL,S	Q	VPA	2
Stock composition	1963-1977	A,L	S	B		2
	1978-1991	A,L	S,CL,CC	B,Q,Q		2
	1992-2001	A,L,W	S,CL,CC	B,Q,Q	Low sampling of large market categories	2
Age determination	1970-1977		S	B		3
	1977-2001		S,CL	B,Q		3
Sex ratio	1970-1987	L,A	S	B	By year class	4,5
	1988-2001				By year or year class	
<b>Maturity:</b>						
A. Ogives (E)	1970-2001	A,L	S	B	Macroscopic observations from spring	2,6,7,8, 9
B. Skip of spawning						
C. Spawning probability						
D. Other						
<b>Fecundity:</b>						
A. Estimation	1879 1999-2000	L,W A,L, W	CL S		Six fish sampled 5Ze: 1999 - 55 ovaries 2000 - 41 ovaries	10 19
B. First time vs repeat spawners						
C. Atresia						
D. Other						
<b>Weight:</b>						
A. Commercial fisheries data	1978-2001	L,A	CL	Q		2

<b>Data basis, format and quality</b>						
<b>Variables</b>	<b>Year range</b>	<b>Data basis (A/L/W)</b>	<b>Data origin</b>	<b>Sampling frequency</b>	<b>Notes on data, methods and contents</b>	<b>Ref. No.</b>
B. Survey data	1992-2001	L,A	S	B		5
C. Other						
<b>Condition:</b>						
A. Fulton	1992-2001	L,A	S	B		5
B. HSI						
C. Energy						
D. Other	1988	L,A	S	B	GSI	4,5
<b>Egg viability:</b>						
A. Egg quality						
B. Fertilisation success						
C. Egg mortality	1978-1999		S	Q	Egg and larval surveys	15
D. Other						
<b>Larval viability:</b>						
A. Hatching success						
B. Larvae quality						
C. Mortality	1977-1987		S	M	Egg and larval survey	11
D. Other						
<b>Spawning time</b>	1963-2001		S	M,Q	Egg and larval survey	1,12, 13,14
<b>Contamination</b>	1980		S	A	12 fish- muscle sample	16
<b>Environmental key factors</b>	1970-2001		S	B	Bottom temperature data	5,18
<b>Other factors or parameters</b>	1973-2001	A,L	S	B	Food habits	17,18

**TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL**

<b>COMMON NAME:</b>	ATLANTIC COD
<b>AREA:</b>	NORTHWEST ATLANTIC
<b>STOCK:</b>	GEORGES BANK AND SOUTH (NAFO DIV. 5Z+SUBAREA 6)

<b>Estimation of reproductive potential</b>			
<b>Subject</b>	<b>Brief description</b>	<b>Year range</b>	<b>Ref. No.</b>
Potential or realised egg production	Estimates of egg production	1978-1999	12,15
Viable egg and larvae production			
Critical life stages			
Environmental influences			
Stock recruitment relations	Spawning stock biomass vs age 1 recruitment	1978-2000	2
Other studies			

**TABLE 4: DATA SOURCES**

<b>COMMON NAME:</b>	ATLANTIC COD
<b>AREA:</b>	NORTHWEST ATLANTIC
<b>STOCK:</b>	GEORGES BANK AND SOUTH (NAFO DIV. 5Z+SUBAREA 6)

<b>Data sources (literature reference or contact person)</b>	
1.	SMITH, W.G. 1985. Temporal and spatial spawning patterns of the principal species of fish and invertebrates in the Georges Bank region. <i>NMFS Sandy Hook Lab.</i> , Rep. No. SHL 85-04, 35 p.
2.	O'BRIEN, L., and N. J. MUNROE. 2001. Assessment of Georges Bank cod stock for 2001. <i>NEFSC Ref. Doc.</i> , No. 01-10, 126 p.
3.	PENTTILA, J. 1988. Atlantic cod (Chapter 6). In: Age determination methods for Northwest Atlantic species. J. Penttila, and L.M. Dery (eds.). <i>NOAA Tech. Rep.</i> , NMFS 72, 135 p.
4.	O'BRIEN, L. 1990. Effects of fluctuations in stock abundance upon life history parameters of Atlantic cod <i>Gadus morhua</i> L., for the 1970-1987 year classes from Georges Bank and the Gulf of Maine M.Sc. Thesis, University of Washington, 95 p.
5.	O'BRIEN, L. Northeast Fisheries Science Center, Woods Hole Laboratory, 166 Water Street, Woods Hole, MA 02543, USA (Loretta.O'Brien@noaa.gov).
6.	O'BRIEN, L., J. BURNETT, and R. K. MAYO. 1993. Maturation of nineteen species of finfish off the northeast coast of the United States, 1985-1990. <i>NOAA Tech. Rep.</i> , NMFS 113, 66 p.
7.	O'BRIEN, L. 1999. Factors influencing the rate of sexual maturity and the effect on spawning stock for Georges Bank and Gulf of Maine Atlantic cod <i>Gadus morhua</i> stocks. <i>J. Northw. Atl. Fish. Sci.</i> , <b>25</b> : 179-203.
8.	BURNETT, J., L. O'BRIEN, R. K. MAYO, J. A. DARDE, and M. L. BOHAN. 1989. The history of maturity sampling and classification schemes used during the NEFC bottom trawl survey program, 1963-1989. <i>NOAA Tech. Mem.</i> , NMFS-F/NEC-76.
9.	LIVINGSTONE, R., Jr., and L. DERY. 1976. An observation on the age and length at maturity of cod in the Georges and Browns stocks. <i>ICNAF Res. Doc.</i> , No. 76/VI/42, 2 p.
10.	EARLL, R.E. 1880. The report on the history and present condition of the shore cod-fisheries of Cape Ann, Mass., together with notes on the natural history and artificial propagation of the species. <i>Report of the U.S. Fish Commission for 1878</i> , VI: 685-740.
11.	MORSE, W. W. 1994. Atlantic cod, <i>Gadus morhua</i> , larvae: an analysis of the MARMAP time series, 1977-1987. <i>NEFSC Ref. Doc.</i> , No. 94-08, 43 p.
12.	BERRIEN, P., and J. SIBUNKA. 1999. Distribution patterns of fish eggs in the U.S. Northeast continental shelf ecosystem, 1977-1987. <i>NOAA Tech. Rep.</i> , NMFS 145, 310 p.
13.	COLTON, J. B., Jr., and R. R. BYRON. 1977. Gulf of Maine-Georges Bank ichthyoplankton collected on ICNAF larval herring surveys September 1971-February 1975. <i>NOAA Tech. Rep.</i> , NMFS SSRF-717, 34 p.
14.	COLTON, J. B., Jr., W. G. SMITH, A. W. KENDALL, Jr., P. L. BERRIEN, and M. P. FAHAY. 1979. Principal spawning areas and times of marine fishes, Cape Sable to Cape Hatteras. <i>Fish. Bull.</i> , <b>76</b> (4), 911-15.
15.	BERRIEN, P. Northeast Fisheries Science Center, J. J. Howard Marine Laboratory, 74 Magruder Road, Sandy Hook, Highlands, NJ 07732.

Data sources (literature reference or contact person)
16. BOEHM, P. D., and P. HIRTZER. 1982. Gulf and Atlantic survey for selected organic pollutants in finfish. <i>NOAA Tech. Mem.</i> , NMFS-F/NEC-13, 111 p.
17. LINK, L. Northeast Fisheries Science Center, Woods Hole Laboratory, 166 Water Street, Woods Hole, MA 02543 U.S.A. ( <a href="mailto:Jason.Link@noaa.gov">Jason.Link@noaa.gov</a> ).
18. FAHAY, M. P., P. L. BERRIEN, D. L. JOHNSON, and W. W. MORSE. 1999. Essential Fish Habitat Source Document: Atlantic cod, <i>Gadus morhua</i> , life history and habitat characteristics. <i>NOAA Tech. Mem.</i> , NMFS-NE-124, 41 p.
19. JEWETT, T. M. 2001. Temporal and spatial variation in reproductive investment within and among populations of Atlantic cod, <i>Gadus morhua</i> . M.Sc. Thesis, Dalhousie Univ., 66 p.

