

TABLE 1: AVAILABLE DATA**COMMON
NAME:**

ATLANTIC COD

SPECIES:*Gadus morhua***AREA:**

NORTHWEST ATLANTIC

STOCK:

NAFO Div. 3NO

CREATED BY:

JOANNE MORGAN

UPDATED BY:

JOANNE MORGAN 2002-03-25

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	√	√	√	(√)	√		(√)	(√)	

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1977	✓	✓	✓	(✓)	✓		(✓)		
1976	✓	✓	✓	(✓)	✓		(✓)		
1975	✓	✓	✓	(✓)	✓		(✓)		
1974	✓	✓	✓		✓		(✓)		
1973	✓	✓	✓		✓		(✓)		
1972	✓	✓	✓		✓		(✓)		
1971	✓	✓	✓		✓		(✓)		
1970	✓	✓	✓		✓		(✓)		
1969	✓	✓	✓		✓		(✓)	(✓)	
1968	✓	✓	✓		✓		(✓)		
1967	✓	✓	✓		✓		(✓)		
1966	✓	✓	✓		✓		(✓)	(✓)	
1965	✓	✓	✓		✓	✓	(✓)		
1964	✓	✓	✓		✓	✓	(✓)		
1963	✓	✓	✓		✓		(✓)		
1962	✓	✓	✓		✓		(✓)	(✓)	
1961	✓	✓	✓		✓		(✓)	(✓)	
1960	✓	✓	✓		✓		(✓)		
1959	✓	✓	✓		✓		(✓)		
1958									
1957									
1956									
1955									
1954									
1953							(✓)	(✓)	
1952							(✓)	(✓)	
1951							(✓)	(✓)	
1950									
1949							(✓)	(✓)	
1948							(✓)	(✓)	
1947							(✓)	(✓)	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO DIV. 3NO	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 12,13
TIMING OF SPAWNING:	APRIL-JUNE	REF. NO.: 5,6,7
OPTIMAL TIME FOR MATURITY SAMPLING:		REF. NO.:

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	1959-1974	A	CL	Q	VPA starting 1959	1
	1975-1976	A,L	CC,CL,S	Q,Q,Y		1
	1977-1988	A,L	CC,CL,S	Q,Q,B		1,10
	1989	A,L	CC,CL,S	Q,Q,3/YR		1,10
	1990-1991	A,L	CC,CL,S	Q,Q,4/YR	few otoliths sampled from the commercial fishery from 1996-1998	1,10
	1992-1994	A,L	CC,CL,S	Q,Q,3/YR		1
	1995-1998	A,L	CC,CL,S	Q,Q,3/YR		1,11
	1999-2000	A,L	CC,CL,S	Q,Q,3/YR	Spanish survey covers only part of stock area	2,11
Stock composition	1959-1974	A	CL	Q	VPA starting 1959	1
	1975-1976	A,L	CC,CL,S	Q,Q,Y		1
	1977-1988	A,L	CC,CL,S	Q,Q,B		1,10
	1989	A,L	CC,CL,S	Q,Q,3/YR		1,10
	1990-1991	A,L	CC,CL,S	Q,Q,4/YR	few otoliths sampled from the commercial fishery from 1996-1998	1,10
	1992-1994	A,L	CC,CL,S	Q,Q,3/YR		1
	1995-1998	A,L	CC,CL,S	Q,Q,3/YR		1,11
	1999-2000	A,L	CC,CL,S	Q,Q,3/YR	Spanish survey covers only part of stock area	2,11
Age determination	1959-1974	A	CL	Q	VPA starting 1959	1
	1975-1976	A	CC,CL,S	Q,Q,Y		1
	1977-1989	A	CC,CL,S	Q,Q,B		1,10
	1990	A	CC,CL,S	Q,Q,3/YR		1,10
	1991	A	CC,CL,S	Q,Q,4/YR	few otoliths sampled from the commercial fishery from 1996-1998	1,10
	1992-1994	A	CC,CL,S	Q,Q,3/YR		1
	1995-1998	A	CC,CL,S	Q,Q,B		1
	1999-2000	A	CC,CL,S	Q,Q,B		2

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.
Sex ratio	1975-1988	A,L	S	Y	Spanish survey covers only part of stock area	2
	1989	A,L	S	B		2
	1990-1994	A,L	S	3/YR		2
	1995-1998	A,L	S	3/YR		2,11
	1999-2000	A,L	S	3/YR		2,11
Maturity:						
A. Ogives (E)	1959-1974	A,L	S	Y	By cohort	3,2
	1975-1995	A,L	S	Y	by cohort and annual	1,2,3
	1996-1998	A,L	S	Y	annual	1
	1999-2000	A,L	S	Y	annual	2
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1964-1965	A,L,W	Not given	APR-MAY	3N and 3O separately	4
	1988-1990	A,L,W	S	Y	small sample size in recent years	2
	1993-1999	A,L,W	S	Y		2
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1959-1998	L	CC,CL	Q	Invariant length/weight relationship	1,9
	1999-2000	L	CC,CL	Q		2,9
B. Survey data	1978-1989	A,L	S	A		2
	1990-2000	A,L	S	B		2
	1947-49, 1951-53, 1961-62, 1966, 1969	A,L	S	VARIOUS		2
C. Other						
Condition:						
A. Fulton	1978-1989	A,L	S	A		2
	1990-2000	A,L	S	B		2
	1947-49, 1951-53, 1961-62, 1966, 1969	A,L	S	VARIOUS		2

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.
B. HSI	1978-1989	A,L	S	A		2
	1990-2000	A,L	S	B		2
	1947-49, 1951-53, 1961- 62,1966, 1969	A,L	S	VARIOUS		2
C. Energy						
D. Other	1978-1989	A,L	S	A	GSI	2
	1990-2000	A,L	S	B		2
	1947-49, 1951-53, 1961- 62,1966, 1969	A,L	S	VARIOUS		2
Egg viability:						
A. Egg quality						
B. Fertilisation success						
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1946-1991	A,L	S	VARIOUS		5,6,7
Contamination						
Environmental key factors						
Other factors or parameters	1994-1999	L	S	Y	Pelagic O group survey	8

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3NO

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production			
Viable egg and larvae production			
Critical life stages			
Environmental influences	Effect of salinity on recruitment	1959-1986	14
Stock recruitment relations	Exploration of relationship of sex ratio, weighted mean age of SSB, and proportion of first time spawners to residuals from Beverton-Holt stock recruit relationship	1959-1995	3
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3NO

Data sources (literature reference or contact person)	
1.	STANSBURY, D. E., P. A. SHELTON, E. F. MURPHY, and J. BRATTEY. MS 1999. An assessment of the cod stock in NAFO Divisions 3NO. <i>NAFO SCR Doc.</i> , No. 62, 46 p.
2.	UNPUBL. DATA: D. E. Stansbury, DFO, P. O. Box 5667, St. John's, NF, A1C 5X1, Canada (stansburyd@dfo-mpo.gc.ca).
3.	MORGAN, M. J., P. A. Shelton, D.P. Stansbury, J. Bratney, and G.R. Lilly. MS 2000. An examination of the possible effect of spawning stock characteristics on recruitment in 4 Newfoundland groundfish stocks. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 28.
4.	MAY, A.W. 1967. Fecundity of Atlantic cod. <i>J. Fish. Res. Bd. Canada</i> , 24 : 1531-1551.
5.	MYERS, R. A., G. MERTZ, and C. A. BISHOP. 1993. Cod spawning in relation to physical and biological cycles of the northern north-west Atlantic. <i>Fish. Oceanogr.</i> , 2 : 154-165.
6.	HUTCHINGS, J. A. and R. A. MYERS. 1993. Effect of age on the seasonality of maturation and spawning of Atlantic cod, <i>Gadus morhua</i> , in the northwest Atlantic. <i>Can. J. Fish. Aquat. Sci.</i> , 50 : 2468-2474.
7.	HUTCHINGS, J. A. and R. A. MYERS. 1994. Timing of cod reproduction: interannual variability and the influence of temperature. <i>Mar. Ecol. Prog. Ser.</i> , 108 : 21-31.
8.	ANDERSON, J. T., E. L. DALLEY, and E. COLBOURNE. MS 1999. Recent trends in the dominant pelagic fish species and environment in the northwest Atlantic, NAFO 2J3KLNO. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 114.
9.	DAVIS, M. B., C. A. BISHOP, D. STANSBURY, and E. F. MURPHY. MS 1994. An assessment of cod in NAFO Divisions 3NO. <i>NAFO SCR Doc.</i> , No. 13.
10.	KUZMIN, S. A. MS 1992. Stock assessment of cod from NAFO Subarea 3 by the data from 1991 trawl acoustic survey. <i>NAFO SCR Doc.</i> , No. 13.
11.	PAZ, X., E. ROMAN, and P. DURAN MUNOZ. MS 2000. Results from the 2000 Spanish bottom trawl survey in the NAFO regulatory area for Divisions 3NO. <i>NAFO SCR Doc.</i> , No. 46.
12.	KJESBU, O. S. 1989. The spawning activity of cod, <i>Gadus morhua</i> L. <i>J. Fish. Biol.</i> , 34 : 195-206.
13.	KJESBU, O. S., P. R. WHITTHAMES, P. SOLEMDAL, and M. GREER WALKER. 1990. Ovulatory rhythm and a method to determine the stage of spawning in Atlantic cod (<i>Gadus morhua</i>). <i>Can. J. Fish. Aquat. Sci.</i> , 47 : 1185-1193.
14.	MYERS, R. A., K. F. DRINKWATER, N. J. BARROWMAN, and J. W. BAIRD. 1993. Salinity and recruitment of Atlantic cod (<i>Gadus morhua</i>) in the Newfoundland region. <i>Can. J. Fish. Aquat. Sci.</i> , 50 : 1599-1609.

