

TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC COD	SPECIES:	<i>Gadus morhua</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	FLEMISH CAP (NAFO DIV. 3M)
CREATED BY:	FRAN SABORIDO-REY 2001-05-30	UPDATED BY:	GEORGE LILLY 2001-08-24 JOANNE MORGAN 2001-10-10

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	√	√	√				(√)		

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
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							(√)	(√)	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	FLEMISH CAP (NAFO DIV. 3M)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.:
TIMING OF SPAWNING:	FEBRUARY-MARCH	REF. NO.: 1,17-27
OPTIMAL TIME FOR MATURITY SAMPLING:	JANUARY-FEBRUARY, JULY	REF. NO.: 1,6

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	1959-1972	A	CL	Q	cohort analysis (except 1969-1971)	15
	1973-1998	A	S,CL	Y,Q	VPA	16
	1978-1985	A	S	Y	Relative abundance	13
	1988-2000	A	S	Y	Relative abundance, VPA	2,3,4,7
	1980-1993	A	S	Y		5
	1995-1996	A	S	Y		5
Stock composition	1959-1972	A,L,W	CL	Q	no data 1969-1971	15
	1973-2000	A,L,W	S,CL	Y,Q		16,3
	1978-1985	A,L,W	S	Y		12, 14
	1988-2000	A,L,W	S	Y		2,3,4,7
	1980-1993	A, L, W	S	Y		5
	1995-1996	A,L,W	S	Y		5
Age determination	1959-1972	A	CL	Q	no data 1969-1971	15
	1973-2000	A	S,CL	Y,Q		16,3
	1978-1985	A	S	Y		12,13
	1988-2000	A	S	Y		2,4
	1980-1993	A	S	Y		5
	1995-1996	A	S	Y		5
Sex ratio	1978-1985	A,L	S	Y		14
	1988-2000	A,L	S	Y		2,3,4,7
	1980-1993	A,L	S	Y		5
	1995-1996	A,L	S	Y		5
Maturity:						
A. Ogives (E)	1990-2000	A,L	S	Y	Microscopic observations	6,7
	1978-1985	A,L	S	Y	Macroscopic obs.	14
	1980-1993	A,L	S	Y	Macroscopic obs.	5
	1995-1996	A,L	S	Y	Macroscopic obs.	5

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. Skip of spawning	1978-1985		S	Y	Visual and microscopic observations	15
C. Spawning probability	1990-2000	A,L	S	Y	Microscopic observations	6,7
D. Other	1978-1985	L	S	Y	Maturity at length	11
Fecundity:						
A. Estimation	1979, 1982-1985	A,L	S	Y		10,14
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1959-1979	A,L	CL	Q	No data 1969-1971, invariant length weight relationship	15
	1980-1987	A,L	CL,CC	Q,Q		16
	1988-2000	A,L	CL,CC	Q,Q		3
B. Survey data	1949-1950	L	S	Y	Individual fish weights	14
	1978-1985	A,L	S	Y		14
	1988-2000	A,L	S	Y		2,3,4
	1980-1993	A,L	S	Y		5
	1995-1996	A,L	S	Y		5
C. Other						
Condition:						
A. Fulton	1949-1950	L	S	Y	Winter values Summer values	14
	1978-1985	A,L	S	Y		14
	1988-2000	A,L	S	Y		7
B. HSI	1978-1985	A,L	S	Y	Winter values	14
C. Energy						
D. Other						
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	1977-1986	A/L	S			1,17-27

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.
Contamination						
Environmental key factors	Temperature; sal.		S	Y	Winter values 1978-1985	14
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	FLEMISH CAP (NAFO DIV. 3M)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production			
Viable egg and larvae production	Basically based on ichthyoplankton surveys	1978-1986	19-25,27
Critical life stages			
Environmental influences	Temperature and oceanographic stability influences on year-class strength and recruitment	1965-1992	8,9,15, 28-30
Stock recruitment relations			
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	FLEMISH CAP (NAFO DIV. 3M)

Data sources (literature reference or contact person)	
1.	LILLY, G. 1987. A synopsis of research related to recruitment of Cod and Redfish on Flemish Cap. <i>NAFO Sci. Coun. Studies</i> , 11: 109-122.
2.	F. SABORIDO and A. VAZQUEZ. 2001. Results from Bottom Trawl Survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22, 56 p.
3.	VAZQUEZ, A. and S. CERVINO. 2001. A Review of the Status of the Cod Stock in NAFO Division 3M. <i>NAFO SCR Doc.</i> , No. 60, 13 p.
4.	VAZQUEZ, A. Institute of Marine Research, Eduardo Cabello, 6, 36208 Vigo, Spain (avazquez@iim.csic.es).
5.	KISELEVA, V. M. 1999. Interannual Dynamics of Growth and Maturity of Cod on Flemish Cap in 1980-1996. <i>NAFO SCR Doc.</i> , No. 10, 13 p.
6.	SABORIDO-REY, F. and S. JUNQUERA. 1998. Histological assessment of variations in sexual maturity of cod (<i>Gadus morhua</i> L.) at the Flemish Cap (North-west Atlantic). <i>ICES Journal of Marine Science</i> , 55: 515-521.
7.	SABORIDO-REY, F. Institute of Marine Research. Eduardo Cabello, 6, 36208 Vigo, Spain (fran@iim.csic.es).
8.	MYERS, R.A., P. PEPIN. 1994. Recruitment variability and oceanography stability. <i>Fisheries Oceanography</i> , Vol. 3, No. 4, pp. 246-255.
9.	TEMPLEMAN, W. 1976. Biological and oceanographic background of Flemish Cap as an area for research on the reasons for year-class success and failure in cod and redfish. <i>ICNAF Res. Bull.</i> , 1: 91-117.
10.	WELLS, R. 1986. Fecundity of cod on the Flemish Cap. <i>NAFO SCR Doc.</i> , No. 112, 2 p.
11.	WELLS, R. 1986. Variations in the gonad weight and the percentage occurrence at length of maturing female cod on the Flemish Cap. <i>NAFO SCR Doc.</i> , No. 114, 4 p.
12.	WELLS, R. 1986. On the validity of age determination of cod from Canadian research vessel cruises to Flemish Cap, 1977-85. <i>NAFO SCR Doc.</i> , No. 90, 17 p.
13.	WELLS, R. and J. BAIRD. 1985. Age compositions of cod in longline samples in 1984 and an abundance estimate from a research vessel survey in 1985 on the Flemish Cap. <i>NAFO SCR Doc.</i> No. 65, 6 p.
14.	LILLY, G. Dept. of Fisheries and Oceans, P.O. Box 5667, St. John's, NF, Canada (lillyg@dfo-mpo.gc.ca).
15.	WELLS, R. 1980. Changes in the size and age composition of the cod stock in Division 3M during the period 1959-1979. <i>NAFO SCR Doc.</i> , No. 28, 18 p.
16.	VAZQUEZ, A., L. MOTOS and J.-C. MAHE. 1999. An assessment of the cod stock in NAFO Division 3M. <i>NAFO SCR Doc.</i> , No. 56, 25 p.
17.	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.
18.	HOLDWAY, D.A., F. W. H. BEAMISH. 1985. The effect of growth rate, size, and season on oocyte development and maturity of Atlantic cod (<i>Gadus morhua</i> L.). <i>J. of Exp. Mar. Biol. And Ecol.</i> , Vol. 85, No. 1: 3-19.
19.	AKHATARINA, T.A. 1987. Results of ichthyoplankton survey on Flemish Cap in April-May 1986. <i>NAFO SCR Doc.</i> , No. 19, 11 p.
20.	AKHATARINA, T.A. and S.V. CHECHENIN. 1986 Results of ichthyoplankton survey on Flemish Cap bank in May-June 1985. <i>NAFO SCR Doc.</i> , No. 63, 6 p.

21.	AKHATARINA, T.A. and S.V. CHECHENIN. 1985. Results of ichthyoplankton survey on Flemish Cap bank in March-April 1984. <i>NAFO SCR Doc.</i> , No. 45, 5 p.
22.	ANDERSON, J. T. 1982. Distribution, abundance and growth of cod (<i>Gadus morhus</i>) and redfish (<i>Sebastes</i> spp.) larvae on Flemish Cap, 1981. <i>NAFO SCR Doc.</i> , No. 37, 11 p.
23.	ANDERSON, J. T. and S. A. AKENHEAD. 1981. Distribution and abundance of redfish and cod larvae on Flemish Cap in 1978 and 1979. <i>NAFO Sci. Coun. Stud.</i> , 1: 57-63.
24.	ANDERSON, J.T. 1981. Larval fish surveys on Flemish Cap, 1980. <i>NAFO SCR Doc.</i> , No. 116, 14 p.
25.	POSTOLAKY, A.I. 1980. Preliminary results of the ichthyoplankton survey carried out on the Flemish Cap in May-July 1978. <i>NAFO SCR Doc.</i> , No. 57, 13 p.
26.	FITZPATRICK, C. and R. J. MILLER. 1979. Review of spawning times and locations for some commercial finfish on the Newfoundland and Labrador coasts. <i>Tech. Rep. Fish. Mar. Serv.</i> , No. 905.
27.	SEREBRYAKOV, V.P. 1978. Ichthyoplankton from the Flemish Cap bank. <i>NAFO SCR Doc.</i> , No. 18, 9 p.
28.	KONSTANTINOV, K.G. 1982. Effect of water temperature on year-class strength of cod from the Flemish Cap Bank. (Abundance and mode of life of commercial fishes from the Northwest Atlantic), Chislennost' i Obraz Zhizni Promyslovykh Ryb Severo-Zapadnoj Atlantiki, 1982, Sb. Nauch. Tr. PINRO, pp. 15-20.
29.	AKENHEAD, S.A. 1982. Flemish Cap cod year-class strength and environmental variables. <i>NAFO SCR Doc.</i> , No. 41, 10 p.
30.	KONSTANTINOV, K.G. 1981. Influence of water temperature on cod year-classes strength on the Flemish Cap bank. <i>NAFO SCR Doc.</i> , No. 77.

